

# **EXHIBIT 14**

19 Rec'd PCT/PTO 03 MAR 2009

FORM PTO-1392 OFFICE (Modified)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK		ATTORNEY'S DOCKET NUMBER 29250H-000013/US	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	
				12/310660 NEW	
EXPRESS MAIL LABEL NO.					
INTERNATIONAL APPLICATION NO.		INTERNATIONAL FILING DATE		PRIORITY DATE CLAIMED	
PCT/CN2007/002449		August 14, 2007		September 7, 2006	
TITLE OF INVENTION METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES					
APPLICANT(S) FOR DO/EO/US Qin YIN, Yingzhong MIU, Jianhua ZHU and Yifeng YAO					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input checked="" type="checkbox"/> is transmitted herewith.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4)</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> have been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11. to 20. below concern document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98-1449, International Search Report (PCT/ISA/210 and PCT/ISA/220) in English and PTO Form 1449</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment.</p> <p>14. <input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: Formal Drawings</p>					

U.S. APPLICATION NO. (if known) <b>12/310660</b> INTERNATIONAL APPLICATION NO. <b>PCT/CN2007/002449</b>		ATTORNEY'S DOCKET NUMBER <b>29250H-000013/US</b>																	
21. <input checked="" type="checkbox"/> The following fees are submitted:  <b>PCT FEES – NATIONAL STAGE:</b>  <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Fee Code</th> <th style="text-align: left;">Description</th> <th style="text-align: left;">Fee</th> </tr> </thead> <tbody> <tr> <td>1631</td> <td>Basic National Stage Fee.....</td> <td>\$330.00</td> </tr> <tr> <td>1642</td> <td>National Stage Search Fee.....</td> <td>\$430.00</td> </tr> <tr> <td>1633</td> <td>National Stage Examination Fee.....</td> <td>\$220.00</td> </tr> </tbody> </table> <b>ENTER APPROPRIATE FEE AMOUNT = 1330.00</b>		Fee Code	Description	Fee	1631	Basic National Stage Fee.....	\$330.00	1642	National Stage Search Fee.....	\$430.00	1633	National Stage Examination Fee.....	\$220.00	<table style="width:100%; border-collapse: collapse;"> <tr> <th style="width:50%;">CALCULATIONS</th> <th style="width:50%;">PTO USE ONLY</th> </tr> <tr> <td colspan="2" style="height: 100px;"></td> </tr> </table>		CALCULATIONS	PTO USE ONLY		
Fee Code	Description	Fee																	
1631	Basic National Stage Fee.....	\$330.00																	
1642	National Stage Search Fee.....	\$430.00																	
1633	National Stage Examination Fee.....	\$220.00																	
CALCULATIONS	PTO USE ONLY																		
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 Months from the earliest claimed priority date (37 CFR 1.492(e)).		<table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">\$ <b>980.00</b></td> <td style="width:50%;"></td> </tr> <tr> <td>\$ <b>130.00</b></td> <td></td> </tr> </table>		\$ <b>980.00</b>		\$ <b>130.00</b>													
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PAGES	PAGES FILED	EXTRA PAGES FILED IN 50 PAGE SEGMENTS	RATE																
Total Pages	33 - 100 = 0	0	X 270.00																
			\$ <b>0.00</b>																
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE																
Total Claims	17 - 20 =	0	X 52.00																
Independent Claims	4 - 3 =	1	X 220.00																
			\$ <b>220.00</b>																
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		+ 390.00	\$ <b>0.00</b>																
<b>TOTAL OF ABOVE CALCULATIONS =</b>			\$ <b>1330.00</b>																
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			\$ _____																
<b>SUBTOTAL =</b>			\$ <b>1330.00</b>																
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 Months from the earliest claimed priority date (37 CFR 1.492(f)).			\$ _____																
<b>TOTAL NATIONAL FEE =</b>			\$ <b>1330.00</b>																
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property +			\$ _____																
<b>TOTAL FEES ENCLOSED =</b>			\$ <b>1330.00</b>																
			Amount to be: refunded \$																
			charged \$																

a. ☒ A check in the amount of **\$1330.00** to cover the above fees is enclosed.

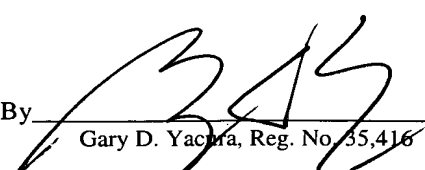
b. ☐ Please charge my Deposit Account. No. 08-0750 in the amount of \$ \_\_\_\_\_ to cover the above fees.  
A triplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-0750.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

Send all correspondence to:  
**Harness, Dickey & Pierce, P.L.C – Customer No. 30593**  
**Post Office Box 8910**  
**Reston, Virginia 20195**

**Date: March 3, 2009**

By   
 Gary D. Yachra, Reg. No. 35,416

GDY:www

12/310660

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: **NEW APPLICATION**

International App. No.: PCT/CN2007/002449

Filing Date: March 3, 2009

Applicant: Qin YIN et al.

Group Art Unit: Unassigned

Examiner: Unassigned

Title: **METHOD AND APPARATUS FOR MANAGING  
ROUTE INFORMATION AND FORWARDING  
DATA IN ACCESS DEVICES**

Attorney Docket: 29250H-000013/US

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**PRELIMINARY AMENDMENT**

Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

March 3, 2009

Sir:

The following preliminary amendments and remarks are respectfully submitted in connection with the above-identified application. Prior to examination of the present application, please consider the following:

**Amendments to the Claims** begin on page 2 of this Preliminary Amendment.

**Remarks** begin on page 7 of this Preliminary Amendment.

	Claims remaining		Highest number		Present extra
<b>Total</b>	17	-	20	=	0
<b>Independent</b>	4	-	3	=	0



New PCT National Phase Application  
Docket No.: 29250H-000013/US

## **IN THE CLAIMS**

This is a complete and current listing of the claims, marked with status identifiers in parentheses. The following listing of claims will replace all prior versions and listings of claims in the application.

## **CLAIMS**

1. (Currently Amended) A method, in an access device of the communication network, for managing route information, comprising ~~steps of~~:

- a. receiving an access response message which is from a server and sent to a user terminal;
- b. obtaining route-related information from said access response message;
- c. based on said route-related information, creating or updating a route table item.

2. (Original) A method according to claim 1, wherein said step b further comprises:

- obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route;
- wherein said step c further comprises:
- based on said predefined using time, updating said route table item.

3. (Original) A method according to claim 2, wherein said step of updating said route table item based on said predefined using time further comprises:

- judging whether a route table item corresponding to said route-related information exists in said route table;
- if a route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time, then updating the remaining time of said route table item to said predefined using time;
- if a route table item corresponding to said route-related information doesn't exist in

New PCT National Phase Application  
Docket No.: 29250H-000013/US

said route table, then creating a route table item corresponding to said route-related information.

4. (Currently Amended) A method according to ~~any one of claim 1 to claim 3~~, further comprising steps of:

- obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message;

wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. (Currently Amended) A method according to ~~any one of claim 1 to claim 4~~, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. (Original) A route management apparatus, in an access device of the communication network, for managing route information, comprising:

- a receiving means, configured to receive an access response message which is from a server and sent to a terminal;

- a first obtaining means, configured to obtain said route-related information from said access response message;

- a route maintenance means, configured to create or update a route table based on said route-related information.

7. (Original) An apparatus according to claim 6, wherein said obtaining means is further configured to obtain a predefined using time from said access response message, said predefined using time is used to indicate the using time of said router;

wherein, said route maintenance means updates said route table item further based on said predefined using time.

8. (Currently Amended) An apparatus according to claim 6 ~~or claim 7~~, wherein said

New PCT National Phase Application  
Docket No.: 29250H-000013/US

route maintenance means comprises:

- a first judging means, configured to judge whether a route table item corresponding to said route-related information exists in said route table;
- a second judging means, configured to judge whether the remaining time of said route table item is shorter than said predefined using time when a route table item corresponding to said route-related information exists in said route table;
- a updating means, configured to update the remaining time of said route table item to said predefined using time when a route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time;
- a creating means, configured to create a route table item corresponding to said route-related information when no route table item corresponding to said route-related information exists in said route table.

9. (Currently Amended) An apparatus according to ~~any one of claim 6 to claim 8~~, further comprising:

- a second obtaining means, configured to obtain correlated information of said route table item and a virtual local area network;

wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. (Currently Amended) An apparatus according to ~~any one of claim 6 to claim 7~~, wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

11. (Original) A method, in an access device of the communication network, for forwarding data, wherein data coming from user terminals of different sub-networks is forwarded to corresponding sub-network gateway.

New PCT National Phase Application  
Docket No.: 29250H-000013/US

12. (Original) A method according to claim 11, comprising steps of:

- a. receiving a packet from a user terminal;
- b. obtaining the source network address of the destination network address from said packet;
- c. based on said source network address and destination network address, inquiring a gateway which can get to the destination network and matches the source network address from a route table, and a forwarding port corresponding to said gateway;
- d. sending said packet to the gateway of said corresponding sub-network via said forwarding port.

13. (Original) A forwarding apparatus, in an access device of the communication network, for forwarding data, wherein data coming from user terminals of different sub-networks is forwarded to gateways of corresponding sub-networks.

14. (Original) An apparatus according to claim 13, comprising:

- a receiving means, configured to receive a packet from a user terminal;
- an obtaining means, configured to obtain the source network address and the destination network address from said packet;
- an inquiring means, configured to inquire a gateway which can get to the destination network and matches the source network address from a route table, and a forwarding port corresponding to said gateway;
- a sending means, configured to send said packet to the gateway of said corresponding sub-network via said forwarding port.

15. (Currently Amended) An access device in the communication network, wherein said access device comprises a route management apparatus according to ~~any one of claim 6 to claim 10 or/and a forwarding apparatus according to claim 13 or claim 14.~~

16. (Original) A device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

New PCT National Phase Application  
Docket No.: 29250H-000013/US

17. (New) An access device in the communication network, wherein said access device comprises a forwarding apparatus according to claim 13.

New PCT National Phase Application  
Docket No.: 29250H-000013/US

**REMARKS**

Claims 1-17 are currently pending in this application. Claims 1, 4, 5, 8-10 and 15 have been amended and claim 17 has been added. No new matter has been added.

**Conclusion**

Accordingly, in view of the above amendments and remarks, an early indication of the allowability of each of claims 1-17 in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Gary Yacura at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.  
extension of time fees.

Respectfully submitted,

HARNESS, DICKY & PIERCE, P.L.C

By: \_\_\_\_\_

Gary D. Yacura, Reg. No. 35,416

P.O. Box 8910  
Reston, Virginia 20195  
(703) 668-8000

GDY/www

## (12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织  
国际局(43) 国际公布日  
2008 年 3 月 20 日 (20.03.2008)

PCT

(10) 国际公布号  
WO 2008/031319 A1

- (51) 国际专利分类号:  
H04L 12/46 (2006.01)
- (21) 国际申请号: PCT/CN2007/002449
- (22) 国际申请日: 2007 年 8 月 14 日 (14.08.2007)
- (25) 申请语言: 中文
- (26) 公布语言: 中文
- (30) 优先权:  
200610030926.0  
2006 年 9 月 7 日 (07.09.2006) CN
- (71) 申请人 (对除美国外的所有指定国): 阿尔卡特朗讯(ALCATEL LUCENT) [FR/FR]; 法国巴黎市波艾蒂耶大街 54 号, Paris 75008 (FR)。
- (72) 发明人; 及
- (75) 发明人/申请人 (仅对美国): 殷芹(YIN, Qin)

[CN/CN]; 中国上海市浦东金桥出口加工区宁桥路 388 号, Shanghai 201206 (CN)。 缪应忠(MIU, Yingzhong) [CN/CN]; 中国上海市浦东金桥出口加工区宁桥路 388 号, Shanghai 201206 (CN)。 朱建华(ZHU, Jianhua) [CN/CN]; 中国上海市浦东金桥出口加工区宁桥路 388 号, Shanghai 201206 (CN)。 姚亦峰(YAO, Yifeng) [CN/CN]; 中国上海市浦东金桥出口加工区宁桥路 388 号, Shanghai 201206 (CN)。

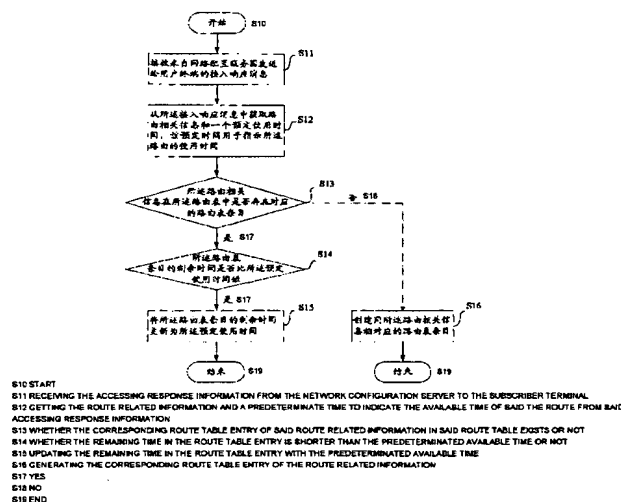
(74) 代理人: 北京市金杜律师事务所(KING & WOOD PRC LAWYERS); 中国北京市朝阳区东三环中路 39 号建外 SOHO 之 A 座 31 层, Beijing 100022 (CN)。

(81) 指定国 (除另有指明, 要求每一种可提供的国家保护): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY,

[见续页]

(54) Title: THE METHOD AND DEVICE FOR MANAGING ROUTE INFORMATION AND RETRANSMITTING DATA IN ACCESSING DEVICE

(54) 发明名称: 接入设备中用于管理路由信息和数据转发的方法及装置



(57) Abstract: A method for generating the route according to the accessing response information in the accessing device of communication network is disclosed to differ the traffic based on the destination IP subnet and make different traffic shunt in the access device. Said method comprises the following steps: receiving the accessing response information from the server to the subscriber terminal; getting the route related information from the accessing response information; generating or updating the route table entry according to said route related information. Said method achieves the traffic shunting based on layer 3 and reduces the demand of the accessing device. Moreover, said method does not operate route protocol in layer 2 of the subscriber and reduces the demand of the border router.

[见续页]

WO 2008/031319 A1

**WO 2008/031319 A1**

MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)。

- (84) 指定国 (除另有指明, 要求每一种可提供的地区保护): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 欧洲 (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS,

**根据细则4.17的声明:**

- 关于申请人有权要求在先申请的优先权 (细则 4.17 (iii))
- 发明人资格 (细则 4.17 (iv))

**本国际公布:**

- 包括国际检索报告。

**(57) 摘要:**

本发明提供一种在通信网络的接入设备中利用接入响应消息来创建路由的方法, 以实现基于目的 IP 子网进行业务区分并转发, 使不同的业务在接入设备上分流。该方法包括下列步骤: 接收来自服务器发送给用于终端的接入响应消息; 从所述接入响应消息中获取路由相关信息; 根据所述路由相关信息创建或更新路由条目。该方法实现了基于三层的业务区分并且降低了对接入设备的要求。同时, 方法还不要求用户侧二层网络运行路由协议, 降低了对边缘路由器的要求。



## 接入设备中用于管理路由信息和数据转发的方法及装置

### 技术领域

本发明涉及通信网络，尤其涉及通信网络的接入网。

5

### 背景技术

目前，电信运营商对二层接入设备的要求越来越高，需要二层设备基于三层信息进行业务区分，使得不同的业务如音频、视频和因特网等在诸如数字用户线路接入复用器（DSLAM）的接入设备上就进行分流，经过各种业务对应的网关接入相应的业务网络。具体而言，运营商通常会事先对业务网络进行规划，不同的业务供应商会拥有不同的IP地址。这样，接入设备可以基于目的IP子网进行业务区分并转发，但是一般接入设备只是二层设备，并不作为用户的网关，在三层上这些接入设备对用户透明的。并且，它们没有专属的IP地址用于数据转发，网络侧相应也就只能创建无编号IP（Unnumbered IP）接口以适应此种需求。这也是节约越来越紧张的IPv4地址提出的要求。

目前已有侦听路由协议报文来创建路由表的方法，但是通常运营商不会在用户侧端口上使能路由协议，基于链路状态的路由协议（诸如开放最短路径优先协议，Open Shortest Path First）通常要求对端拥有三层地址，这是不能满足的；基于距离向量的路由协议（诸如选路信息协议，Routing Information Protocol），虽然可用，可是对运营商路由协议的选择提出了限制，且在用户端网络运行路由协议增加了网络复杂性和二层网络负载，对二层设备提出了更高的要求，需要支持路由协议。

一般说来，二层设备很难获得三层的路由信息。静态配置每个这样的接入设备，不仅工作量非常大，而且丧失了二层设备即插即用（plug&play）的优点。这个问题由此成为了比较尖锐的问题。

本发明就是提出了一种利用终端接入网络时，服务器产生的接入响应消息来在二层设备上创建路由，用于基于目的IP子网进行业务区

分并转发的方法和装置。这里的接入响应消息是指动态主机分配协议 (Dynamic Host Configuration Protocol, DHCP) 响应消息。下面将对动态主机分配协议进行简单的介绍。

动态主机分配协议:

- 5 DHCP分为两个部分: 一个是服务器端, 而另一个是客户端。所有的IP网络设定资料都由DHCP服务器集中管理, 并负责处理客户端的DHCP要求; 而客户端则会使用从服务器分配下来的IP环境资料。

### 1. DHCP的分配形式

- 首先, 必须至少有一台DHCP服务器工作在网络上, 它会监听  
10 网络的DHCP请求, 并与客户端磋商TCP/IP的设定环境。它提供两种IP定位方式: 自动分配, 其情形是: 一旦DHCP客户端第一次成功的从DHCP服务器端租用到IP地址之后, 就永远使用这个地址。

- 动态分配, 当DHCP第一次从DHCP服务器端租用到IP地址之后, 并非永久的使用该地址, 只要租约到期, 客户端就得释放(release)  
15 这个IP地址, 以给其它工作站使用。当然, 客户端可以比其它主机更优先的延续(renew)租约, 或是租用其它的IP地址。

### 2. DHCP的工作原理

- 视乎客户端是否第一次登录网络, DHCP的工作形式会有所不同。下面参照图1对客户机第一次登录网络时DHCP工作的情形进行详细  
20 说明。

第一次登录的时候:

- 1) 寻找Server。当DHCP客户端第一次登录网路的时候, 也就是客户发现本机上没有任何IP资料设定, 它会向网络发出一个DHCPDISCOVER封包。因为客户端还不知道自己属于哪一个网络,  
25 所以封包的来源地址会为0.0.0.0, 而目的地址则为255.255.255.255, 然后再附上DHCPDISCOVER的信息, 向网络进行广播。

在Windows的预设情形下, DHCPDISCOVER的等待时间预设为1秒, 也就是当客户端将第一个DHCPDISCOVER封包送出去之后, 在1秒之内没有得到回应的话, 就会进行第二次DHCPDISCOVER广播。

WO 2008/031319

PCT/CN2007/002449

若一直得不到回应的情况下，客户端一共会有四次DHCPDISCOVER广播(包括第一次在内)，除了第一次会等待1秒之外，其余三次的等待时间分别是9、13、16秒。如果都没有得到DHCP服务器的回应，客户端则会显示错误信息，宣告DHCPDISCOVER的失败。之后，基于  
5 使用者的选择，系统会继续在5分钟之后再重复一次DHCPDISCOVER的过程。

2) 提供IP租用地址。当DHCP服务器监听到客户端发出的DHCPDISCOVER广播后，它会从那些还没有租出的地址范围内，选择最前面的空置IP，连同其它TCP/IP设定，回应给客户端一个  
10 DHCPOFFER封包。

由于客户端在开始的时候还没有IP地址，所以在其DHCPDISCOVER封包内会带有其MAC地址信息，并且有一个XID编号来辨别该封包，DHCP服务器回应的DHCPOFFER封包则会根据这些资料传递给要求租约的客户。根据服务器端的设定，DHCPOFFER  
15 封包会包含一个租约期限的信息。

3) 接受IP租约。如果客户端收到网络上多台DHCP服务器的回应，只会挑选其中一个DHCPOFFER而已(通常是最先抵达的那个)，并且会向网络发送一个DHCPREQUEST广播封包，告诉所有DHCP服务器它将指定接受哪一台服务器提供的IP地址。

20 同时，客户端还会向网络发送一个ARP封包，查询网络上面有没有其它机器使用该IP地址；如果发现该IP已经被占用，客户端则会送出一个DHCPDECLINE封包给DHCP服务器，拒绝接受其DHCPOFFER，并重新发送DHCPDISCOVER信息。

4) 租约确认。当DHCP服务器接收到客户端的DHCPREQUEST之后，  
25 会向客户端发出一个DHCPACK回应，以确认IP租约的正式生效，也就结束了一个完整的DHCP工作过程。

### 发明内容

本发明的目的是提供一种在通信网络的接入设备中利用接入响

WO 2008/031319

PCT/CN2007/002449

应消息来创建路由的方法，以实现基于目的 IP 子网进行业务区分并转发，使不同的业务在接入设备上进行分流。

根据本发明的第一个方面，提供了一种在通信网络的接入设备中管理路由信息的方法，首先接收来自服务器发送给用户终端的接入响应消息，然后从所述接入响应消息中提取路由相关信息，根据所述路由相关信息创建或更新路由表。

根据本发明的第二个方面，提供一种在通信网络的接入设备中用于管理路由信息的路由管理装置。该路由管理装置包括接收装置、第一获取装置和路由维护装置。接收装置接收来自服务器端发送给终端的接入响应消息；第一获取装置从所述接入响应消息中获取所述路由相关信息；路由维护装置根据所述路由相关信息创建或更新路由表。

根据本发明的第三个方面，提供了一种在通信网络的接入设备中用于数据转发的方法，其特征在于，将来自属于不同子网的用户终端的数据转发到各自对应的子网网关。

根据本发明的第四个方面，提供了一种在通信网络的接入设备中用于数据转发的转发装置，其特征在于，将来自不同子网的用户终端的数据，转发到各自对应的子网网关。

与现有技术相比，本发明具有以下优点：

1. 不影响路由协议的选择。
2. 不要求用户侧二层网络运行路由协议。
3. 减少了对边缘路由器的要求。
4. 减少了管理员的维护工作,是实现即插即用的重要条件。
5. 在实现基于三层区分业务的前提下,降低了对接入设备的要求。

## 附图说明

通过阅读以下参照附图对非限制性实施例所作的详细描述，本发明的其它特征、目的和优点将会变得更明显。

图 1a 为动态主机配置协议的帧结构示意图；

WO 2008/031319

PCT/CN2007/002449

图 1b 为动态主机配置协议帧结构中的选项结构示意图;

图 2 为根据本发明的一个具体实施方式在通信网络的接入设备中用于管理路由信息的方法流程图;

图 3a 为根据本发明的一个具体实施方式接入网的一个网络拓扑结构示意图;

图 3b 为根据本发明的一个具体实施方式接入网的另一个网络拓扑结构示意图;

图 4 为根据本发明的一个具体实施方式在通信网络的接入设备中用于管理路由信息的路由管理装置框图;

图 5 为根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的方法的流程图;

图 6 为根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的转发装置框图。

## 15 具体实施方式

图 1a 是 DHCP 包的封装格式, DHCP 的消息都封装在 UDP 数据报里, DHCP 中的选项是允许厂商定义选项(Vendor-Specific Area), 以提供更多的设定信息(如 Netmask、Gateway、DNS、等等), 其长度可变, 同时可有多个选项。每个选项的第一个字节为选项代码, 其后一个字节为后面项目内容的长度, 最后为项目内容, 如图 1b 所示的 DHCP 消息中的选项(option)格式。DHCP 利用 0x53 选项代码来设定封包类别: 1 为 DHCP-DISCOVER, 2 为 DHCP-OFFER, 3 为 DHCP-REQUEST, 4 为 DHCP-DECLINE, 5 为 DHCP-ACK, 6 为 DHCP-NACK, 7 为 DHCP-RELEASE。

DHCP 标准中定义了三个静态路由相关的选项, Option 3, 33 和 121。其中 option 3 用于申明 client 对应的网关, 可以是多个, 按优先级顺序排列。Option 33 提出得较早, 是申明静态类别路由信息的。Option 121 则是包含了前两者, 申明所有的静态路由, 包含默认路由, 并且支持无类型域间路由。这些选项是服务器在分配 IP 地址的同时,

WO 2008/031319

PCT/CN2007/002449

配置给客户端的，使客户端能正确建立起路由表。值得注意的是，对于整个网络而言，用户的网关和规划好的业务提供商的地址都是不会经常变动的，它们是位于两端的 IP 地址，是网络拓扑的端点，不会随着网络拓扑的变化而变化。所以可以认为，这些路由是静态的，可以由管理员在服务器上预先配置，配置量也是不大的。

对于接入设备，它位于边缘路由器和用户中间，也不受拓扑变化的影响。因此这些静态路由对于接入设备是足够的。

介于目前网络的现状，无类型域间路由已经被广泛使用，接入设备主要应该依靠侦听每个 DHCP-ACK 报文中的 option121 来实现上行路由的学习，维护。

下面将结合图 2-图 6 对本发明作进一步详细描述。

图 2 示出了根据本发明的一个具体实施方式在通信网络的接入设备中的管理路由信息的方法流程图。

首先，在步骤 S11 中，接收来自服务器发送给用户终端的接入响应消息。

然后，在步骤 S12 中，从所述接入响应消息中获取路由相关信息。

最后，根据所述路由相关信息来创建或更新路由表条目。

如果所述接入响应消息中还包括指示所述路由能够使用的时间的预定使用时间，则在步骤 S12 中，同时获取该预定使用时间；最后，同时结合所述路由相关信息和所述预定使用时间来更新或创建所述路由表条目。

其中更新或创建所述路由表条目的步骤又具体可分为步骤 S13、S14、S15 和 S16。

首先，在步骤 S13 中，判断判断所述路由相关信息在所述路由表中是否存在对应的路由表条目。

如果所述路由相关信息在所述路由表中存在对应的路由表条目，则在步骤 S14 中判断所述路由表条目的剩余时间是否比所述预定使用时间短。

如果所述路由表条目的剩余时间比所述预定使用时间短，则在步



WO 2008/031319

PCT/CN2007/002449

步骤 S15 中将所述路由表条目的剩余时间更新为所述预定使用时间。

如果所述路由相关信息在所述路由表中没有相对应的路由表条目，则在步骤 S16 中创建同所述路由相关信息相对应的路由表条目。

当接入设备和与其相连的各个子网网关（或者也称之为边缘路由器）之间采取虚拟局域网（VLAN）配置的时候，从地址解析协议（ARP）或者接入响应消息中获取所述路由表条目和虚拟局域网的关联信息。

图 3a 和图 3b 示出了根据本发明的一个具体实施方式接入网的两个网络拓扑结构示意图。在图 3a 中，每个虚拟局域网都有一个响应用户接入请求的服务器，在图 3b 中，三个虚拟局域网共享一个响应用户接入请求的服务器。

通常情况下，如图 3a 和图 3b 所示的网络拓扑结构图，接入设备 0 可以通过来自各个子网网关的地址解析协议的应答帧中的虚拟局域网标签中获取虚拟局域网的信息，和各个路由相关联。其详细流程如下，接入设备 0 首先接收一个来自用户设备的数据包，假设该数据包发送到服务 a 万维网中，接入设备 0 根据数据包中的源网络地址和目的网络地址从所创建的路由表中找到其转发的下一跳的目的网络地址，然后发出地址解析协议请求帧来向下一跳目的主机（在图 3a 和图 3b 中即为边缘路由器 a）查询其链路层地址。下一跳目的主机收到该请求后回应一个地址解析协议响应帧，该响应帧中包含有虚拟局域网标签。接入设备 0 接收到所述包含有虚拟局域网标签的地址解析协议响应帧时，从中提取出该虚拟局域网的信息，同该路由相关连。

如果每个虚拟局域网内部都有一个（或多个）响应用户接入请求的服务器，如图 3a 所示，在这种网络配置下，也可以通过接入响应消息中的虚拟局域网标签获取虚拟局域网的信息，从而和路由相关信息关联。如果是多个虚拟局域网共享一个响应用户接入请求的服务器，如图 3b 所示，则不能通过接入响应消息中的虚拟局域网标签获取和路由相关信息关联的虚拟局域网信息，此时只能通过地址解析协议消息来获取和路由相关信息关联的虚拟局域网信息。

在目前的网络实现中，上述接入请求消息和接入响应消息为动态

WO 2008/031319

PCT/CN2007/002449

主机配置协议消息，所述预定使用时间为该动态主机配置协议响应消息中的租赁时间。

图 4 示出了根据本发明的一个具体实施方式在通信网络的接入设备中用于管理路由信息的路由管理装置 1 框图。该路由管理装置 1 包  
5 括接收装置 11、第一获取装置 12、第二获取装置 13 和路由维护装置 14。其中路由维护装置 14 包括第一判断装置 141、第二判断装置 142、更新装置 143 和创建装置 144。

首先，接收装置 11 接收来自服务器端发送给终端的接入响应消息。

10 然后，第一获取装置 12 从所述接入响应消息中获取所述路由相关信息，同时还获取一个预定使用时间，该预定时间用于指示所述路由的使用时间。

如果接入设备和与其相连的各个子网网关（或者也称之为边缘路由器）之间采取虚拟局域网配置的时候，第二获取装置 13 从地址解  
15 析协议消息或接入响应消息中获取所述路由表条目和虚拟局域网的关联信息。

通常情况下，如图 3a 和图 3b 所示，可以通过来自各个子网网关的地址解析协议的应答帧中的虚拟局域网标签中获取虚拟局域网的信息，和各个路由相关联。其详细过程如下，接入设备 0 首先接收一个来自用户设备的数据包，假设该数据包发送到服务 a 万维网中，接入设备 0 根据数据包中的源网络地址和目的网络地址从所创建的路由表中找到其转发的下一跳的目的网络地址，然后发出地址解析协议请求帧来向下一跳目的主机（在图 3a 和图 3b 中即为边缘路由器 a）查询其链路层地址。下一跳目的主机收到该请求后回应一个地址解析协议响应帧，该响应帧中包含有虚拟局域网标签。接入设备 0 接收到所述包含有虚拟局域网标签的地址解析协议响应帧时，第二获取装置 13 从中提取出该虚拟局域网的信息，同该路由相关连。  
20  
25

如果每个虚拟局域网内部都有一个（或多个）响应用户接入请求的服务器，如图 3a 所示，在这种网络配置下，也可以通过接入响应



WO 2008/031319

PCT/CN2007/002449

消息中的虚拟局域网标签获取虚拟局域网的信息，从而和路由相关信息关联。如果是多个虚拟局域网共享一个响应用户接入请求的服务器，如图 3b 所示，则不能通过接入响应消息中的虚拟局域网标签获取和路由相关信息关联的虚拟局域网信息，此时只能通过地址解析协议消息来获取和路由相关信息关联的虚拟局域网信息。

最后，路由维护装置 14 根据所述路由相关信息创建或更新路由表。

在路由维护装置 14 的一个优选实施例中，根据第一获取装置 12 获得的路由相关信息和预定使用时间以及第二获取装置 13 获得的虚拟局域网信息，第一判断装置 141 首先判断所述路由相关信息在所述路由表中是否存在对应的路由表条目。

如果所述路由相关信息在所述路由表中存在对应的路由表条目时，第二判断装置 142 判断所述路由表条目中的剩余时间是否比所述预定使用时间短。

如果所述路由相关信息在所述路由表中存在对应的路由表条目并且所述路由表条目中的剩余时间比所述预定使用时间短，更新装置 143 将所述路由表条目的剩余时间更新为所述预定使用时间。

如果路由相关信息在所述路由表中不存在对应的路由表条目，创建装置 144 创建同所述路由相关信息相对应的路由表条目。

在目前的网络实现中，上述接入请求消息和接入响应消息为动态主机配置协议消息，所述预定使用时间为该动态主机配置协议响应消息中的租赁时间。

图 5 示出了根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的方法的流程图。该方法在于，将来自属于不同子网的用户终端的数据转发到各自对应的子网网关。如图 5 所示，该方法可分为四个步骤。

首先，在步骤 S21 中，接收来自用户终端的数据包。

其次，在步骤 S22 中，从数据包中获取源网络地址与目的网络地址。

WO 2008/031319

PCT/CN2007/002449

然后，在步骤 S23 中，根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网关，及其相对应的转发端口。

最后，在步骤 S24 中，将该数据包经由所述转发端口发送给所述  
5 相应子网的网关。

在目前的网络实现中，上述网络地址为 IP 地址。

在一个优先实施例中，接入设备对于每个子网分别维护一个子网路由表。首先接收来自用户终端的数据包；其次根据所述数据包的源 IP 地址查询出其相应的子网路由表；然后根据所述数据包的目  
10 的地址从所述相应的子网路由表中查询出相应的路由表条目，从而确定所述数据包的转发端口；最后将数据包经由所述转发端口发送给所述相应子网的网关。

在另外一个优选实施例中，接入设备仅维护一个路由表。首先接收来自用户终端的数据包；其次根据所述数据包目的 IP 地址从所述  
15 路由表中查询出与所述目的地址相关的一个或多个路由表条目；然后利用所述数据包源 IP 地址来由所述与目的地址相关的一个或多个路由表条目中确定与其所属子网的网关相对应的路由表条目，并确定所述数据包的转发端口；最后将数据包经由所述转发端口发送给所述相应子网的网关。

20 图 6 示出了根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的转发装置 2 框图。该转发装置 2 在于将来自不同子网的用户终端的数据，转发到各自对应的子网网关。

该转发装置 2 包括接收装置 21、获取装置 22、查询装置 23 和发送装置 24。

25 首先，接收装置 21 接收来自用户终端的数据包。

其次，获取装置 22 从所述数据包中获取源网络地址与目的网络地址。

然后，查询装置 23 根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网

WO 2008/031319

PCT/CN2007/002449

关，及其相对应的转发端口；

最后，发送装置 24 将该数据包经由所述转发端口发送给所述相应子网的网关。

在目前的网络实现中，上述网络地址为 IP 地址。

5 在一个优选实施例中，接入设备对于每个子网分别维护一个子网路由表。首先，接收装置 21 接收来自用户终端的数据包；其次，获取装置 22 从所述数据包中获取源网络地址和目的网络地址；然后，查询装置 23 根据所述数据包的源 IP 地址查询出其相应的子网路由表；再根据所述数据包的目的 IP 地址从所述相应的子网路由表中查  
10 询出相应的路由表条目，从而确定所述数据包的转发端口；最后，发送装置 24 将数据包经由所述转发端口发送给所述相应子网的网关。

在另外一个优选实施例中，接入设备仅维护一个路由表。首先，接收装置 21 接收来自用户终端的数据包；其次，获取装置 22 从所述数据包中获取源网络地址和目的网络地址；然后，查询装置 23 根据  
15 所述数据包目的 IP 地址从所述路由表中查询出与所述目的地址相关的一个或多个路由表条目；再利用所述数据包源 IP 地址来由所述与目的地址相关的一个或多个路由表条目中确定与其所属子网的网关相对应的路由表条目，并确定所述数据包的转发端口；最后，发送装置将数据包经由所述转发端口发送给所述相应子网的网关。

20 以上对本发明的具体实施例进行了描述。需要理解的是，本发明并不局限于上述特定实施方式，本领域技术人员可以在所附权利要求的范围内做出各种变形或修改。

## 权 利 要 求

1. 一种在通信网络的接入设备中用于管理路由信息的方法，其特征在于，包括以下步骤：

- 5       a. 接收来自服务器发送给用户终端的接入响应消息；
- b. 从所述接入响应消息中获取路由相关信息；
- c. 根据所述路由相关信息创建或更新路由表条目。

2. 根据权利要求 1 所述的方法，其特征在于，所述步骤 b 还包括：

- 从所述接入响应消息中获取一个预定使用时间，该预定使用
- 10    间用于指示所述路由的使用时间；

其中，所述步骤 c 还包括：

- 根据所述预定使用时间来更新所述路由表条目。

3. 根据权利要求 2 所述的方法，其特征在于，所述根据所述预定时间来更新所述路由表条目的信息的步骤还包括：

- 15       - 判断所述路由相关信息在所述路由表中是否存在对应的路由表
- 条目；

- 如果所述路由相关信息在所述路由表中存在对应的路由表条目，并且所述路由表条目的剩余时间比所述预定使用时间短，则将所述路由表条目的剩余时间更新为所述预定使用时间；

- 20       - 如果所述路由相关信息在所述路由表中没有相对应的路由表
- 条目，则创建同所述路由相关信息相对应的路由表条目。

4. 根据权利要求 1-3 中任一项所述的方法，其特征在于，还包括以下步骤：

- 从地址解析协议消息或接入响应消息中获取所述路由表条目和
- 25    虚拟局域网的关联信息；

其中，所述接入设备和与其相连接的各个边缘路由器之间采取所述虚拟局域网配置。

5. 根据权利要求 1-4 中任一项所述的方法，其特征在于，所述接入响应消息是指动态主机配置协议（DHCP）响应消息，所述预定

WO 2008/031319

PCT/CN2007/002449

使用时间为该动态主机配置协议响应消息中的租赁时间。

6. 一种在通信网络的接入设备中用于管理路由信息的路由管理装置，其特征在于，包括：

- 接收装置，用于接收来自服务器端发送给终端的接入响应消息；
- 5     - 第一获取装置，从所述接入响应消息中获取所述路由相关信息；
- 路由维护装置，用于根据所述路由相关信息创建或更新路由表。

7. 根据权利要求 6 所述的装置，其特征在于，所述获取装置还用于从所述接入响应消息中获取一个预定使用时间，该预定时间用于指示所述路由的使用时间；

10     其中，所述路由维护装置还根据所述预定使用时间来更新所述路由表条目。

8. 根据权利要求 6 或 7 所述的装置，其特征在于，所述路由维护装置包括：

15     - 第一判断装置，用于判断所述路由相关信息在所述路由表中是否存在对应的路由表条目；

   - 第二判断装置，用于判断当所述路由相关信息在所述路由表中存在对应的路由表条目时，所述路由表条目中的剩余时间是否比所述预定使用时间短；

20     - 更新装置，用于当所述路由相关信息在所述路由表中存在对应的路由表条目并且所述路由表条目中的剩余时间比所述预定使用时间短时，将所述路由表条目的剩余时间更新为所述预定使用时间；

   - 创建装置，用于当路由相关信息在所述路由表中不存在对应的路由表条目时，创建同所述路由相关信息相对应的路由表条目。

25     9. 根据权利要求 6-8 中任一项所述的装置，其特征在于，还包括：

   第二获取装置，用于从地址解析协议消息或接入响应消息中获取所述路由表条目和虚拟局域网的关联信息；

   其中，所述接入设备和与其相连接的各个边缘路由器之间采取所述虚拟局域网配置。

WO 2008/031319

PCT/CN2007/002449

10. 根据权利要求 6-9 中任一项所述的装置，其特征在于，所述接入响应消息是指动态主机配置协议（DHCP）响应消息，所述预定使用时间为该动态主机配置协议响应消息中的租赁时间。

5 11. 一种在通信网络的接入设备中用于数据转发的方法，其特征在于，将来自属于不同子网的用户终端的数据转发到各自对应的子网网关。

12. 根据权利要求 11 所述的方法，其特征在于，包括以下步骤：

i. 接收来自用户终端的数据包；

ii. 由所述数据包中获取源网络地址与目的网络地址；

10 iii. 根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网关，及其相对应的转发端口；

iv. 将该数据包经由所述转发端口发送给所述相应子网的网关。

15 13. 一种在通信网络的接入设备中用于数据转发的转发装置，其特征在于，将来自不同子网的用户终端的数据，转发到各自对应的子网网关。

14. 根据权利要求 13 所述的装置，其特征在于，包括：

接收装置，用于接收来自用户终端的数据包；

20 获取装置，用于由所述数据包中获取源网络地址与目的网络地址；

查询装置，用于根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网关，及其相对应的转发端口；

25 发送装置，用于将该数据包经由所述转发端口发送给所述相应子网的网关。

15. 一种通信网络中的接入设备，其特征在于，包含权利要求 6 - 10 中任一项所述的路由管理装置或/和权利要求 13 或 14 所述的转发装置。

30 16. 根据权利要求 15 中所述的设备，其特征在于，该接入设备为数字用户线路接入复用器(DSLAM)。

WO 2008/031319

PCT/CN2007/002449

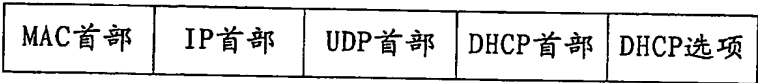


图 1a

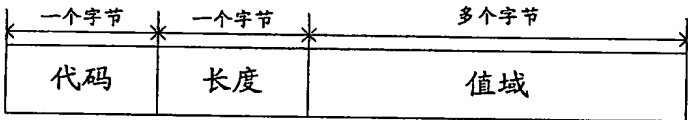


图 1b

WO 2008/031319

PCT/CN2007/002449

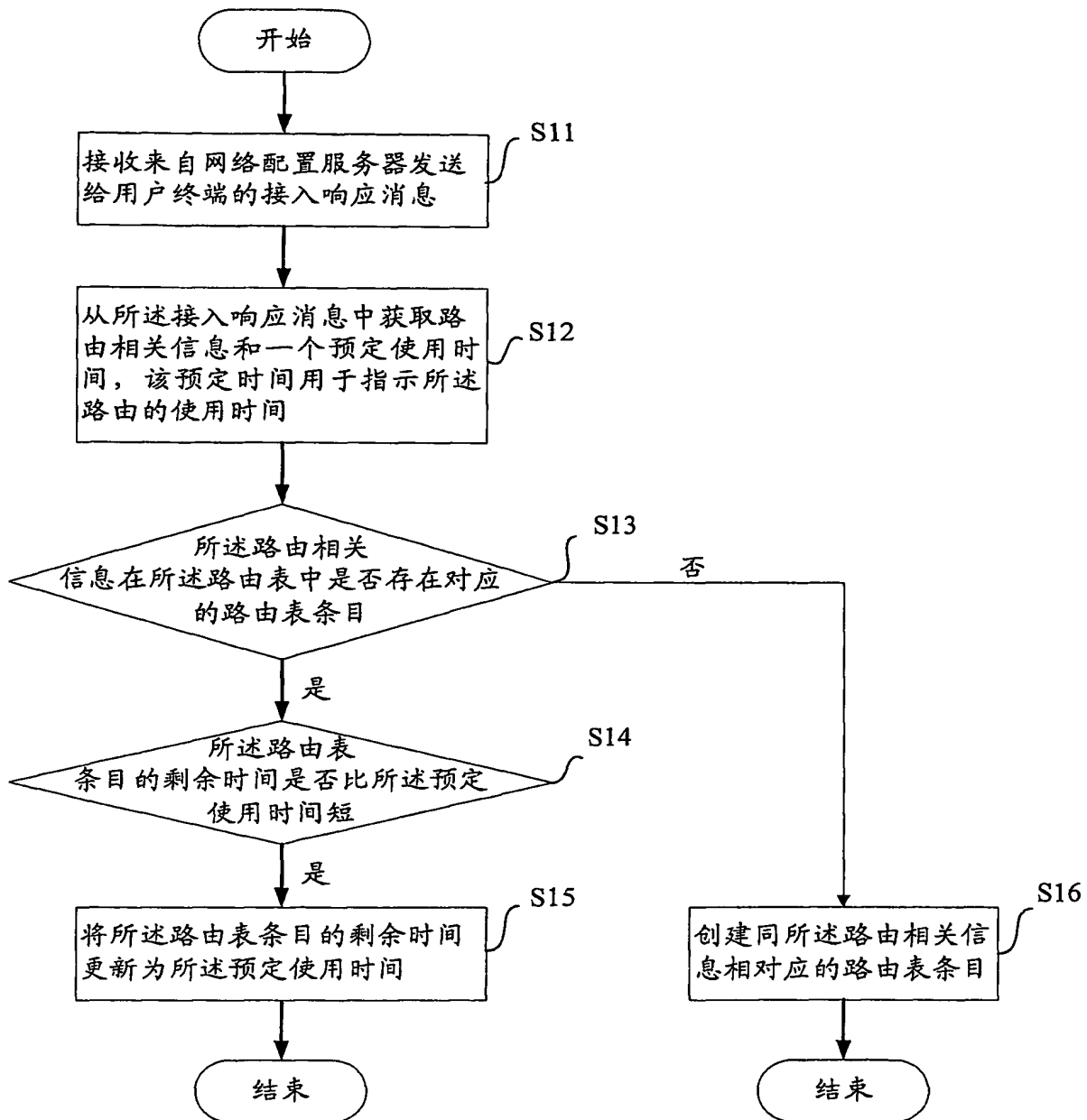


图 2



WO 2008/031319

PCT/CN2007/002449

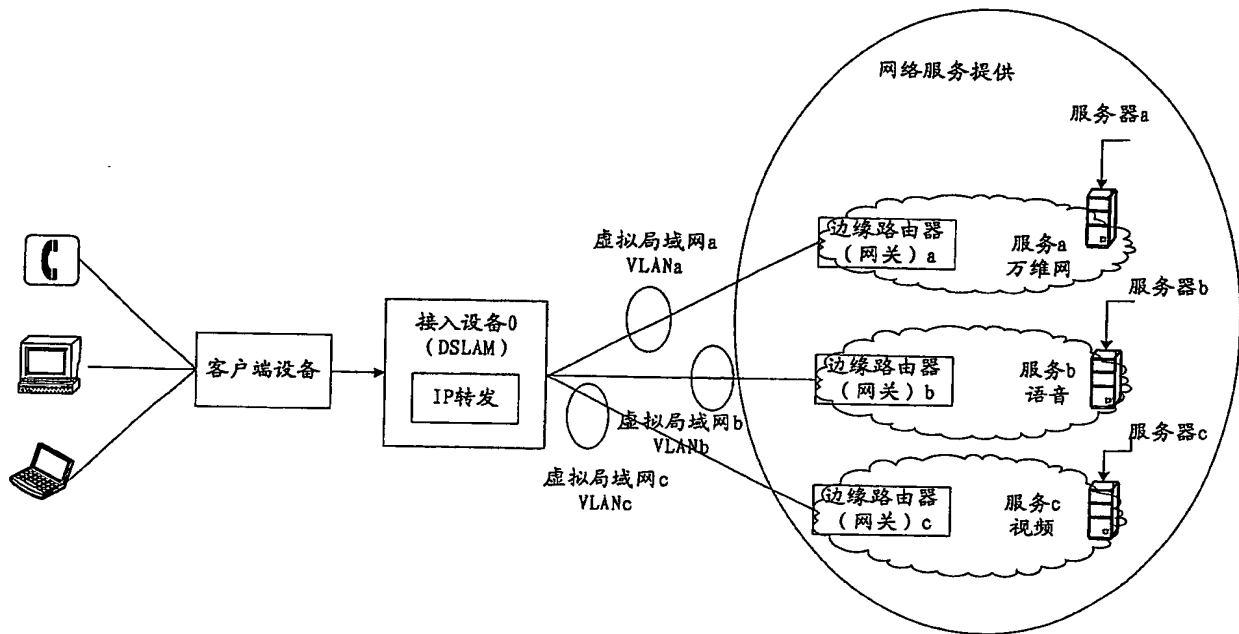


图 3a

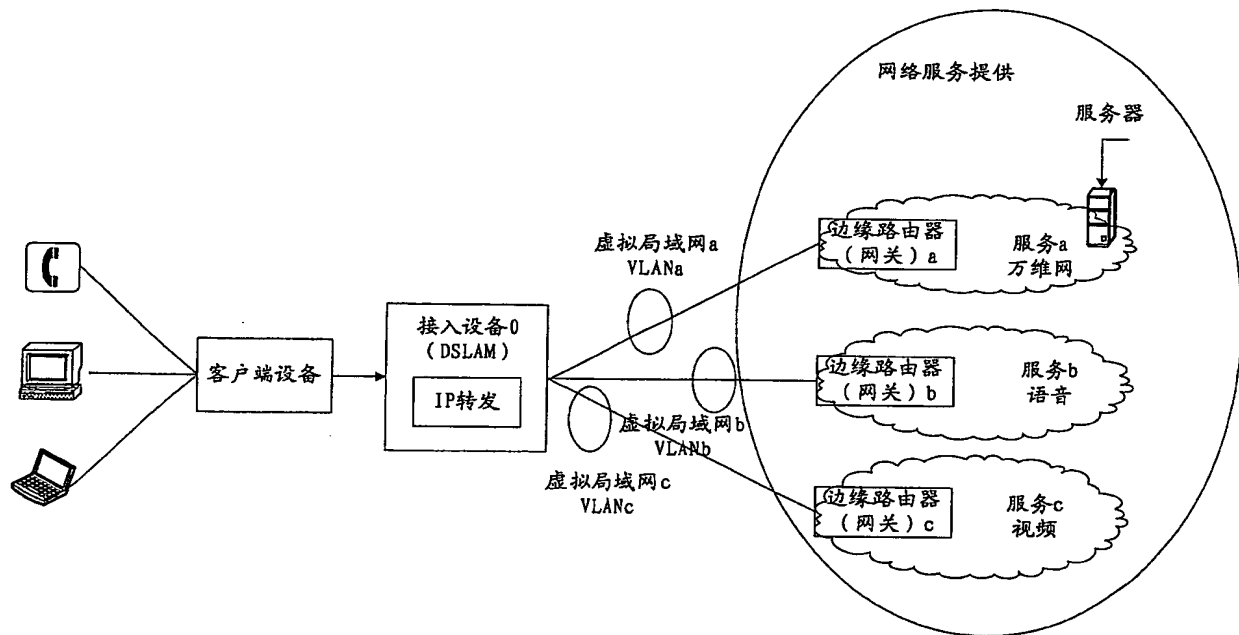


图 3b

WO 2008/031319

PCT/CN2007/002449

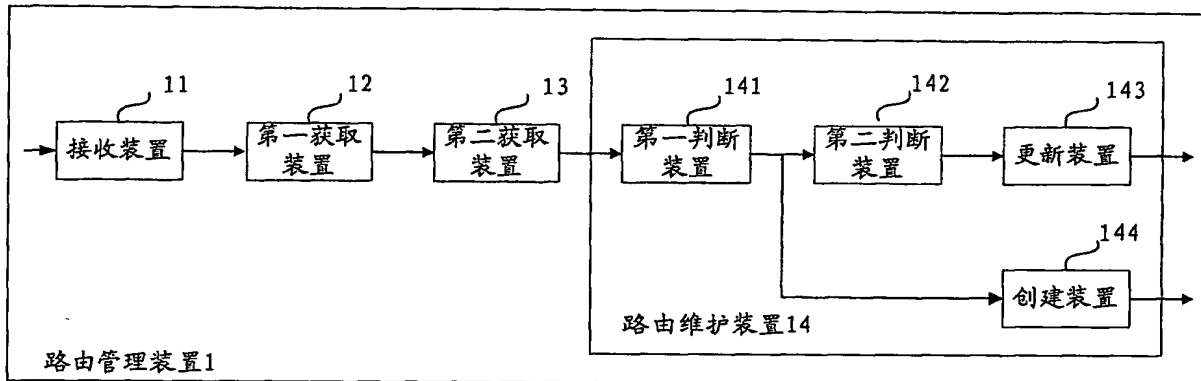


图 4

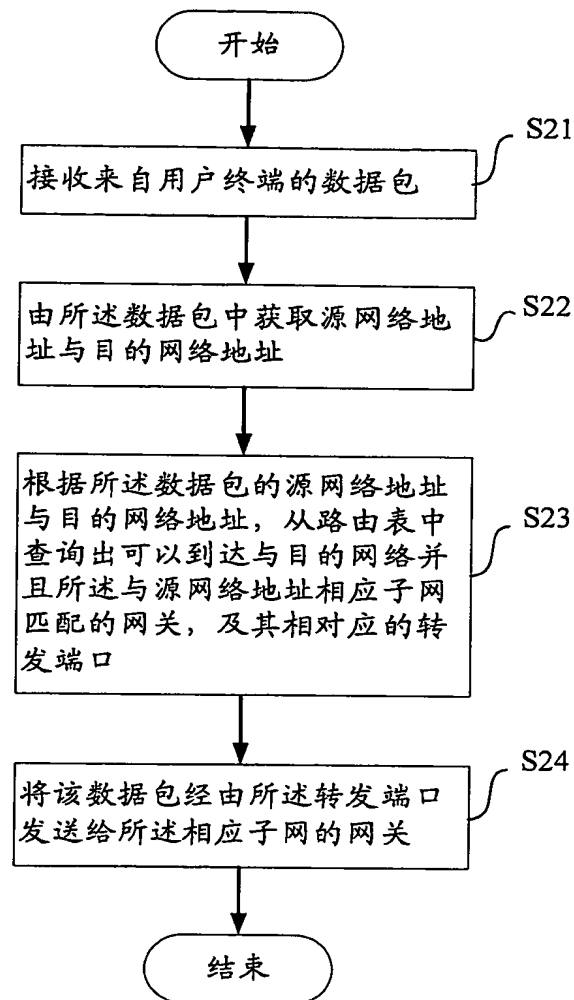


图 5

WO 2008/031319

PCT/CN2007/002449

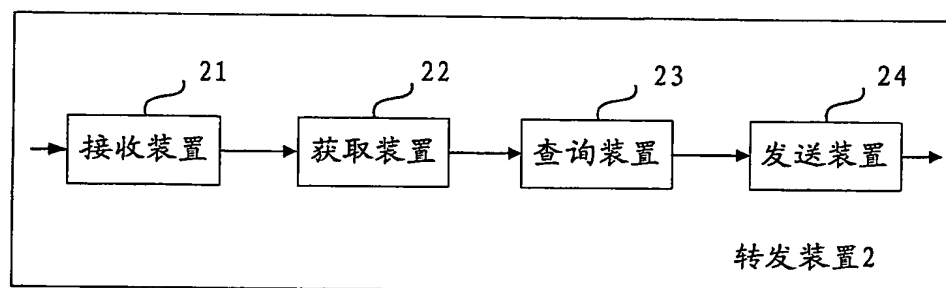


图 6

## METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES

### Technical field

The present invention relates to the communication network, particularly to the access network of the communication network.

### Background of the invention

Currently, the requirements for layer 2 access devices put forward by telecom operators are higher and higher. Layer 2 devices are required to distinguish services based on layer 3 information, so that different services, such as audio, video, Internet and so on, can be distributed in access devices like the Digital Subscriber Line-Access Multiplexer (DSLAM) and access to corresponding service networks via gateways corresponding to different services. Concretely, operators will generally plan service networks in advance, and different service providers possess different IP addresses. In this way, access devices can distinguish and forward services based on destination IP sub-networks. However, common access devices are only layer 2 devices and not used as user gateways, therefore these access devices are transparent to users in the third layer. Moreover, they don't have dedicated IP addresses for forwarding data. Therefore, accordingly, the network can only create unnumbered IP interfaces to meet this requirement.

And this is also used to cope with the requirement for saving IPv4 addresses which are becoming scarcer.

Presently, there is a method for creating route tables by monitoring route protocol messages. But operators normally don't enable route protocols on the ports on the user side. Route protocols based on link statuses (e.g. Open Shortest Path First) normally requires the correspondent node to have layer 3 addresses, however, this requirement can not be satisfied. Although route protocols based on distance vectors (e.g. Routing Information Protocol) are usable, restrictions are put forward when operators choose route protocols, and employing route protocols in the user-end network increases the complexity of the network and the load of the layer 2 network. Since layer 2 devices should support route protocols in this way, higher requirements are put forward for them.

Generally, it is very difficult for layer 2 devices to obtain layer 3 route information. Configuring each such access device statically not only leads to high work load, but also makes layer 2 devices lose their advantage of plug&play. Thus, this becomes a relative prominent problem.

The present invention proposes a method and an apparatus for distinguishing services and forwarding data based on destination IP sub-networks by creating routes on layer 2 devices via the use of access response messages generated by servers when terminal devices access to the network. Here, the access response message refers to the Dynamic Host

Configuration Protocol (DHCP) response message. Below, a brief introduction will be made about the DHCP.

#### Dynamic Host Configuration Protocol (DHCP):

The DHCP can be divided into two parts: one is the server end, while the other is the client end. DHCP servers run centralized management of all IP network setting information, and are responsible for dealing with DHCP requirements of the client end; while the client end uses IP environment information assigned from servers.

##### 1. assignment forms of DHCP

At first, there must be at least one DHCP server working in the network. It monitors DHCP requirements of the network and negotiates with the client end about the setting environment of TCP/IP. Two kinds of IP positioning ways are provided:

automatic assignment, its circumstance is: once the DHCP client end has successfully leased an IP address from the DHCP server for the first time, it will use this address for ever;

dynamic assignment: once the DHCP client end has leased an IP address from the DHCP server for the first time, it doesn't use this address for ever. As long as the lease expires, the client end should release this IP address, so as to provide it to other work stations. Of course, the client end can renew the lease with higher priorities than other hosts, or lease other IP addresses.

## 2. work principle of DHCP

Depending on whether it is the first time for the client end to log on the network, the working form of DHCP will be different. Below, the working form of DHCP when it is the first time for the client end to log on the network will be detailed described with reference to Fig. 1.

Logging on the network for the first time:

1) Searching Server. When the DHCP end client logs on the network for the first time, namely the client finds there is no IP information setting in the host, it will send a DHCPDISCOVER packet to the network. Since the client hasn't known to which network it belongs yet, the source address of the packet is 0.0.0.0, and the destination address is 255.255.255.255, then the packet is attached with DHCPDISCOVER information and broadcasted to the network.

Under the circumstances of the Windows default setting, the waiting time of DHCPDISCOVER is preset as 1 second, namely after the client end has sent the first DHCPDISCOVER packet, if no response is obtained within 1 second, the second DHCPDISCOVER broadcast will be performed. Under the circumstances that no response is obtained all along, the client end will conduct totally four DHCPDISCOVER broadcasts (including the first DHCPDISCOVER broadcast), the waiting time for the first broadcast is 1 second, and the waiting time for the other three broadcasts is 9 seconds, 13 seconds and 16 seconds respectively. If there is still no response of the



DHCP server, the client end will display error information and declares the failure of DHCPDISCOVER. After that, based on the choice of the user, the system will continue to repeat the DHCPDISCOVER process once again after 5 minutes.

2) Providing an IP lease address. After the DHCP server has monitored the DHCPDISCOVER broadcast sent by the client end, it will choose the most front unleased IP address from the range of the addresses which have not been leased, together with other TCP/IP settings, to form a DHCPDISCOVER packet and sent the same to the client end as a response.

Since the client end doesn't have IP address at the beginning, there is MAC address information contained in the DHCPDISCOVER packet, and there is an XID number to identify this packet. Based on this information, the DHCPOFFER packet responded by the DHCP server is forwarded to the client needing the lease. According to the setting of the server end, the DHCPOFFER packet contains information of the lease term.

3) Accepting an IP lease. If the client end receives responses of multiple DHCP servers in the network, it will only choose one of the DHCPOFFERs (generally the one that arrives earliest), and send a DHCPREQUEST broadcast packet to the network in order to tell all DHCP servers that it will accept the IP address provided by which server.

At the same time, the client end will also send an ARP packet to the network to enquire whether there are any other hosts using this IP address in

the network; if it is found that this IP address has been occupied, the client end will send a DHCPDECLINE packet to the DHCP server, so as to decline to accept its DHCPOFFER and resend a DHCPDISCOVER message.

4) Acknowledging the lease. After the DHCP server has received the DHCPREQUEST of the client end, it will send a DHCPACK response to the client end in order to acknowledge that the IP lease has come into effect formally, namely a whole DHCP working process is completed.

#### Summary of the invention

The object of the present invention is to provide a method, in access devices of the communication network, for making use of access response messages to create routes, so as to distinguish services and forward based on destination IP sub-networks and make different services distribute in access devices.

According to the first aspect of the present invention, there is provided a method for managing route information in an access device of the communication network. The method comprises the steps of: at first, receiving an access response message which is from the server and sent to a user terminal; then, extracting route-related information from said access response message, and creating or updating the route table based on said route-related information.

According to the second aspect of the present invention, there is

provided a route management apparatus for managing route information in an access device of the communication network. The route management apparatus comprises a receiving means, a first obtaining means and a route maintenance means. The receiving means receives an access response message which is from the server and sent to a user terminal; the first obtaining means extracts route-related information from said access response information; the route maintenance means creates or updates the route table based on said route-related information.

According to the third aspect of the present invention, there is provided a method for forwarding data in an access device of the communication network, wherein data from user terminals belonging to different sub-networks is forwarded to corresponding sub-network gateways.

According to the fourth aspect of the present invention, there is provided a forwarding apparatus for forwarding data in an access device of the communication network, wherein data from user terminals belonging to different sub-networks is forwarded to corresponding sub network gateways.

As compared with the prior art, the present invention has following advantages:

1. Not influencing the choice of route protocols;
2. Not requiring layer 2 network on the user side to execute route protocols;
3. Reducing the requirements for the marginal routers;

4. Reducing the maintenance work of administrators, which is the important condition for realizing plug&play;

5. Under the premise that services are distinguished based on layer 3, reducing the requirements for access devices.

#### Brief description of the drawings

Other features, objects and advantages of the present invention will be apparent by reading the following detailed description of non-limiting exemplary embodiments with reference to appended drawings.

Fig. 1a illustrates the frame structure of DHCP;

Fig. 1b illustrates the option structure in the frame structure of DHCP;

Fig. 2 illustrates the flowchart of the method for managing route information in an access device of the communication network according to an embodiment of the present invention;

Fig. 3a illustrates a network topological structure of the access network according to an embodiment of the present invention;

Fig. 3b illustrates another network topological structure of the access network according to an embodiment of the present invention;

Fig. 4 illustrates the block diagram of the route management apparatus for managing route information in an access device of the communication network according to an embodiment of the present invention;

Fig. 5 illustrates the flowchart of the method for forwarding data in an

access device of the communication network according to an embodiment of the present invention;

Fig. 6 illustrates the block diagram of the forwarding apparatus for forwarding data in an access device of the communication network according to an embodiment of the present invention.

### Detailed description of the embodiments

Fig. 1a illustrates the encapsulation format of a DHCP packet. All DHCP messages are encapsulated in UDP packets. The options in DHCP are vendor-specific area, so as to provide more setting information (e.g. Netmask, Gateway, DNS, etc.), and its length can be variable and there can be multiple options at the same time. The first byte of each option is the option code, its subsequent byte shows the length of the option content hereafter, and the rest is the option content, such as the option format in a DHCP message shown in Fig. 1b. DHCP employs the option code 0x53 to set the packet type: 1 represents DHCP-DISCOVER, 2 represents DHCP-OFFER, 3 represents DHCP-REQUEST, 4 represents DHCP-DECLINE, 5 represents DHCP-ACK, 6 represents DHCP-NACK and 7 represents DHCP-RELEASE.

In the DHCP standard, three static route-related options are defined: option 3, option 33 and option 121. Wherein, option 3 is used to declare the gateway corresponding to the client. There can be multiple gateways in correspondence with the client, which are ordered according to the priority.

Option 33 is put forward relative early, and is used to declare static type route information. Option 121 comprises the former two. It declares all static routes, including default routes, and supports Classless Inter-Domain Routing. These options are configured to the client end at the same time when the server is assigning IP addresses, so that the client end can create the route table correctly. It is worth noting that, for the whole network, user gateways and planned addresses of service providers are not often changed. They are located at two ends of the IP addresses and are the end points of the network topology and won't change with the network topology. Therefore, these routes can be regarded as static and can be pre-configured in the server by administrators. The configuration load is also not very large.

For an access device, it is located between the marginal router and the user and won't be influenced by the topology change. Hence, these static routes are sufficient for the access device.

Considering the current situation of the network, Classless Inter-Domain Routing has been widely used. An access device should learn and maintain the upstream route mainly depending on monitoring option 121 in each DHCP-ACK packet.

Below, the present invention will be further elucidated in conjunction with Fig. 2 to Fig. 6.

Fig. 2 illustrates the flowchart of the method for managing route information in an access device of the communication network according to

an embodiment of the present invention.

At first, in step S11, an access response message which is from a server and sent to a user terminal is received.

Then, in step S12, route-related information is extracted from said route-related message.

Finally, a route table item is created or updated based on said route-related information.

If said access response message further comprises the predefined using time indicating the time which can be used by said route, then in step S12, said predefined using time is obtained simultaneously; finally, the route table item is updated or created in conjunction with said route-related information and said predefined using time.

Wherein the step in which said route table item is updated or created can be concretely divided into steps S13, S14, S15 and S16.

At first, in step S13, judging whether a route table item corresponding to said route-related information exists in said route table.

If a route table item corresponding to said route-related information exists in said route table, then in step S14, judging whether the remaining time of said route table item is shorter than said predefined using time.

If the remaining time of said route table item is shorter than said predefined using time, then updating the remaining time of said route item to the said predefined using time.

If no route table item corresponding to said route-related information exists in said route table, then in step S16, creating a route-related item corresponding to said route-related information.

If the virtual local area network (VLAN) configuration is employed between an access device and each sub-network gateway (also referred to as a marginal router) connected with the access device, correlated information of said route table item and the VLAN is obtained from the address resolution protocol (ARP) message or the access response message.

Fig. 3a and 3b illustrates two network topological structures of the access network according to an embodiment of the present invention. In Fig. 3a, each VLAN has a server responding to user access requests. In Fig. 3b, three VLANs share a server responding to user access requests.

In general cases, such as the network topological structure graphs shown in Fig. 3a and 3b, the access device 0 can obtain information of the VLAN via the VLAN tag in the acknowledgment frame of the ARP from each sub-network gateway, and correlate the information with corresponding route. The detailed flow is as below: at first, the access device 0 receives a packet from a user device. Assume that the packet is sent to the service a (world wide web). Based on the source network address and the destination network address in the packet, the access device 0 finds the destination network address of the next hop of the forwarding, then sends a ARP request frame to the host of the next hop (namely the marginal route a shown in Fig.



3a and 3b) so as to inquire its link layer address. After receiving this request, the host of the next hop responds with an ARP response frame comprising a VLAN tag. When receiving said ARP response frame comprising a VLAN tag, the access device 0 extracts the information of the VLAN and correlates it with the route.

If there is one (or more) server(s) in each VLAN which responds to user access requests, as shown in Fig. 3a, under such network configuration, information of the VLAN can also be obtained by the VLAN tag in an access response message, and then correlated with the route-related information. If multiple VLANs share one server responding to user access requests, as shown in Fig. 3b, then the VLAN information correlated with the route-related information can not be obtained via the VLAN tag in the access response message. At this time, the VLAN information correlated with the route-related information can only be obtained by the ARP message.

In current network realizations, aforesaid access request message and access response message are DHCP messages, and said predefined using time is the lease time in the DHCP message.

Fig. 4 illustrates the block diagram of the route management apparatus 1 for managing route information in an access device of the communication network according to an embodiment of the present invention. The route management apparatus 1 comprises a receiving means 11, a first obtaining means 12, a second obtaining means 13 and a route maintenance means 14.

Wherein the route maintenance means 14 comprises a first judging means 141, a second judging means 142, an updating means 143 and a creating means 144.

At first, the receiving means 11 receives an access response message which is from the server end and sent to the terminal.

Then, the first obtaining means 12 obtains said route-related information from said access response message and obtains a predefined using time at the same time. The predefined using time is used to indicate the using time of said route.

If the VLAN configuration is employed between an access device and each sub-network gateway (also referred to as a marginal router) connected with the access device, the second obtaining means 13 obtains the correlated information of said route table item and the VLAN from the ARP message or the access response message.

In general cases, as shown in Fig. 3a and 3b, the information of the VLAN can be obtained via the VLAN tag in the acknowledgment frame of the ARP from each sub-network gateway, and correlate the information with corresponding route. The detailed flow is as below: at first, the access device 0 receives a packet from a user device. Assume that the packet is sent to the service a (world wide web). Based on the source network address and the destination network address in the packet, the access device 0 finds the destination network address of the next hop of the forwarding, then sends a

ARP request frame to the host of the next hop (namely the marginal route a shown in Fig. 3a and 3b) so as to inquire its link layer address. After receiving this request, the host of the next hop responds with an ARP response frame comprising a VLAN tag. When receiving said ARP response frame comprising a VLAN tag, the access device 0 extracts the information of the VLAN and correlates it with the route.

If there is one (or more) server(s) in each VLAN which responds to user access requests, as shown in Fig. 3a, under such network configuration, information of the VLAN can also be obtained by the VLAN tag in the access response message, and then correlated with the route-related information. If multiple VLANs share one server responding to user access requests, as shown in Fig. 3b, then the VLAN information correlated with the route-related information can not be obtained via the VLAN tag in the access response message. At this time, the VLAN information correlated with the route-related information can only be obtained by the ARP message.

Finally, the route maintenance means 14 creates or updates the route table based on said route-related information.

In a preferred embodiment of the route maintenance means 14, according to the route-related information, the predefined using time obtained by the first obtaining means 12 and the VLAN information obtained by the second obtaining means 13, the first judging means 141 first judges whether a route table item corresponding to said route-related information

exists in said route table.

If a route table item corresponding to said route-related information exists in said route table, the second judging means 142 judges whether the remaining time in said route table item is shorter than said predefined using time.

If a route table item corresponding to said route-related information exists in said route table and the remaining time in said route table item is shorter than said predefined using time, the updating means 143 updates the remaining time of said route table item to the predefined using time.

If no route table item corresponding to said route-related information exists in said route table, the creating means 144 creates a route table item corresponding to said route-related information.

In current network realizations, aforesaid access request message and access response message are DHCP messages, and said predefined using time is the lease time in the DHCP message.

Fig. 5 illustrates the flowchart of the method for forwarding data in an access device of the communication network according to an embodiment of the present invention. The method consists in that data from user terminals belonging to different sub-networks is forwarded to corresponding sub-network gateway. As shown in Fig. 5, the method can be divided into four steps.

At first, in step S21, a packet from a user terminal is received.

Then, in step S22, the source network address and the destination network address are obtained from the packet.

After that, in step S23, based on the source network address and the destination network address of said packet, a gateway which can get to the destination network and matches the source network address is inquired from the route table. In addition, the forwarding port corresponding to said gateway is also obtained.

Finally, in step S24, the packet is sent to the gateway of said corresponding sub-network via said forwarding port.

In current network realizations, aforesaid network addresses are IP addresses.

In a preferred embodiment, an access device maintains a sub-network route table respectively for each sub-network. At first, a packet from a user terminal is received; then, based on the source IP address of said packet, a corresponding sub-network route table is inquired; after that, based on the destination IP address of said packet, the corresponding route table item is inquired from said corresponding sub-network route table, so as to determine the forwarding port of said packet; finally, the packet is sent to the gateway of said corresponding sub-network via said forwarding port.

In another preferred embodiment, an access device only maintains one route table. At first, a packet coming from a user terminal is received; then based on the destination IP address of said packet, one or more route table

items correlated with said destination address are inquired from said route table; after that, by using the source IP address of said packet, the route table item corresponding to the gateway belonging to its sub-network is determined from said one or more route table items correlated with said destination address, and the forwarding port of said packet is also determined; finally, the packet is sent to said corresponding sub-network's gateway via said forwarding port.

Fig. 6 illustrates the block diagram of the forwarding apparatus 2 for forwarding data in an access device of the communication network according to an embodiment of the invention. The forwarding apparatus 2 forwards data from user terminals of different sub-networks to the gateways of corresponding sub-networks.

The forwarding apparatus comprises a receiving means 21, an obtaining means 22, an inquiring means 23 and a sending means 24.

At first, the receiving means 21 receives a packet from a user terminal.

Then, the obtaining means 22 obtains the source network address and the destination network address from said packet.

After that, based on the source network address and the destination network address of said packet, the inquiring means 23 inquires a gateway from the route table which can get to the destination network and match the source network address, and a forwarding port corresponding to said gateway.

Finally, the sending means 24 sends said packet to the gateway of said corresponding sub-network via said forwarding port.

In current network realizations, aforesaid network addresses are IP addresses.

In a preferred embodiment, an access device maintains a sub-network route table respectively for each sub-network. At first, the receiving means 21 receives a packet from a user terminal; then, the obtaining means 22 obtains the source network address and the destination network address from said packet; after that, based on the destination IP address of said packet, the inquiring means 23 inquires its corresponding sub-network route table; and then, based on the destination IP address of said packet, the inquiring means 23 inquires the corresponding route table item from said corresponding sub-network route table, so as to determine the forwarding port of said packet; finally, the sending means 24 sends said packet to the gateway of said corresponding sub-network via said forwarding port.

In another preferred embodiment, an access device only maintains one route table. At first, the receiving means 21 receives a packet coming from a user terminal; then, the obtaining means 22 obtains the source network address and the destination network address from said packet; after that, based on the destination IP address of said packet, the inquiring means 23 inquires one or more route table items correlated with said destination address from said route table; afterwards, by using the source IP address of

said packet, the route table item corresponding to the gateway belonging to its sub-network is determined from said one or more route table items correlated with said destination address, and the forwarding port of said packet is also determined; finally, the sending means sends said packet to the gateway said corresponding sub-network via said forwarding port.

Above, embodiments of the present invention have been described. It should be understood that the present invention is not limited to aforementioned specific embodiments. Those skilled in the art can make various variations and modifications within the scope of the appended claims.



What is claimed is:

1. A method, in an access device of the communication network, for managing route information, comprising steps of:

a. receiving an access response message which is from a server and sent to a user terminal;

b. obtaining route-related information from said access response message;

c. based on said route-related information, creating or updating a route table item.

2. A method according to claim 1, wherein said step b further comprises:

- obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route;

wherein said step c further comprises:

- based on said predefined using time, updating said route table item.

3. A method according to claim 2, wherein said step of updating said route table item based on said predefined using time further comprises:

- judging whether a route table item corresponding to said route-related information exists in said route table;

- if a route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time, then updating the remaining time of

said route table item to said predefined using time;

- if a route table item corresponding to said route-related information doesn't exist in said route table, then creating a route table item corresponding to said route-related information.

4. A method according to any one of claim 1 to claim 3, further comprising steps of:

- obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message;

wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. A method according to any one of claim 1 to claim 4, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. A route management apparatus, in an access device of the communication network, for managing route information, comprising:

- a receiving means, configured to receive an access response message which is from a server and sent to a terminal;

- a first obtaining means, configured to obtain said route-related information from said access response message;

- a route maintenance means, configured to create or update a route table based on said route-related information.

7. An apparatus according to claim 6, wherein said obtaining means is further configured to obtain a predefined using time from said access response message, said predefined using time is used to indicate the using time of said router;

wherein, said route maintenance means updates said route table item further based on said predefined using time.

8. An apparatus according to claim 6 or claim 7, wherein said route maintenance means comprises:

- a first judging means, configured to judge whether a route table item corresponding to said route-related information exists in said route table;

- a second judging means, configured to judge whether the remaining time of said route table item is shorter than said predefined using time when a route table item corresponding to said route-related information exists in said route table;

- a updating means, configured to update the remaining time of said route table item to said predefined using time when a route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time;

- a creating means, configured to create a route table item

corresponding to said route-related information when no route table item corresponding to said route-related information exists in said route table.

9. An apparatus according to any one of claim 6 to claim 8, further comprising:

- a second obtaining means, configured to obtain correlated information of said route table item and a virtual local area network;

wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. An apparatus according to any one of claim 6 to claim 7, wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

11. A method, in an access device of the communication network, for forwarding data, wherein data coming from user terminals of different sub-networks is forwarded to corresponding sub-network gateway.

12. A method according to claim 11, comprising steps of:

- i. receiving a packet from a user terminal;
- ii. obtaining the source network address of the destination network address from said packet;
- iii. based on said source network address and destination network address, inquiring a gateway which can get to the destination

network and matches the source network address from a route table, and a forwarding port corresponding to said gateway;

iv. sending said packet to the gateway of said corresponding sub-network via said forwarding port.

13. A forwarding apparatus, in an access device of the communication network, for forwarding data, wherein data coming from user terminals of different sub-networks is forwarded to gateways of corresponding sub-networks.

14. An apparatus according to claim 13, comprising:

- a receiving means, configured to receive a packet from a user terminal;
- an obtaining means, configured to obtain the source network address and the destination network address from said packet;
- an inquiring means, configured to inquire a gateway which can get to the destination network and matches the source network address from a route table, and a forwarding port corresponding to said gateway;
- a sending means, configured to send said packet to the gateway of said corresponding sub-network via said forwarding port.

15. An access device in the communication network, wherein said access device comprises a route management apparatus according to any one of claim 6 to claim 10 or/and a forwarding apparatus according to claim 13 or claim 14.

16. A device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

### Abstract

The present invention provides a method for creating routes in access devices of the communication network by using access response messages. With the method provided by the present invention, services can be distinguished and forwarded based on destination IP sub-networks, so that different services can be distributed in access devices. In this way, on the premise that services are distinguished based on layer 3, the requirements for access devices are reduced and layer 2 networks on the user side are not required to carry out route protocols, which decreases administrators' maintenance work and is the important condition for the realization of plug&play and reduces the requirements for marginal routers.

Drawings

MAC header	IP header	UDP header	DHCP header	DHCP options
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Fig. 1a

one byte	one byte	multiple bytes
code	length	value field

Fig. 1b



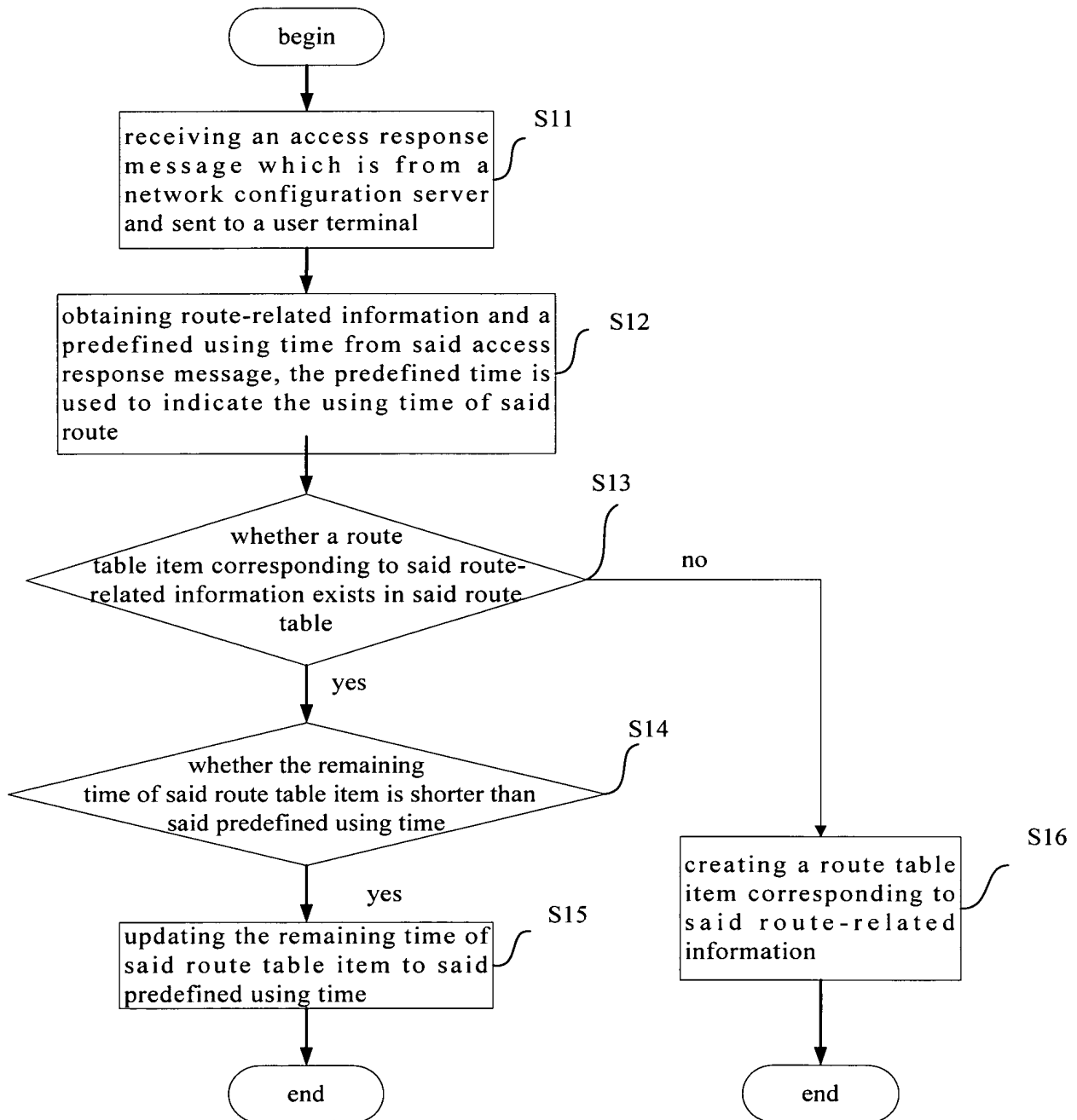


Fig. 2

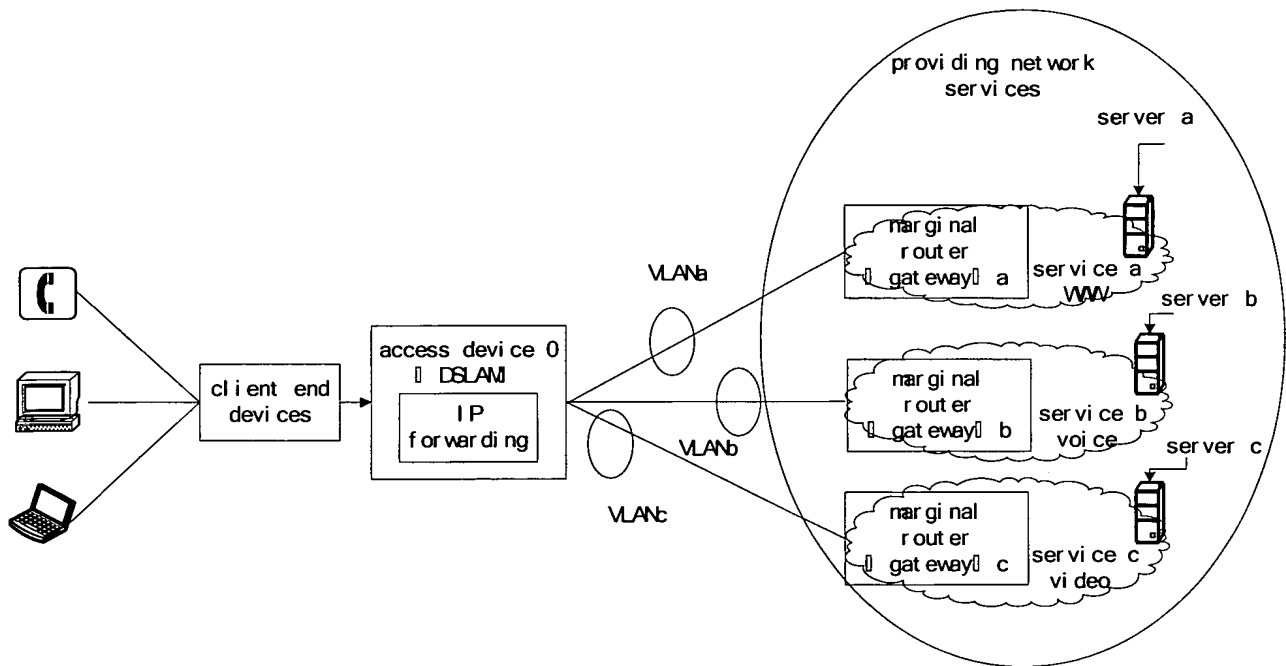


Fig. 3a

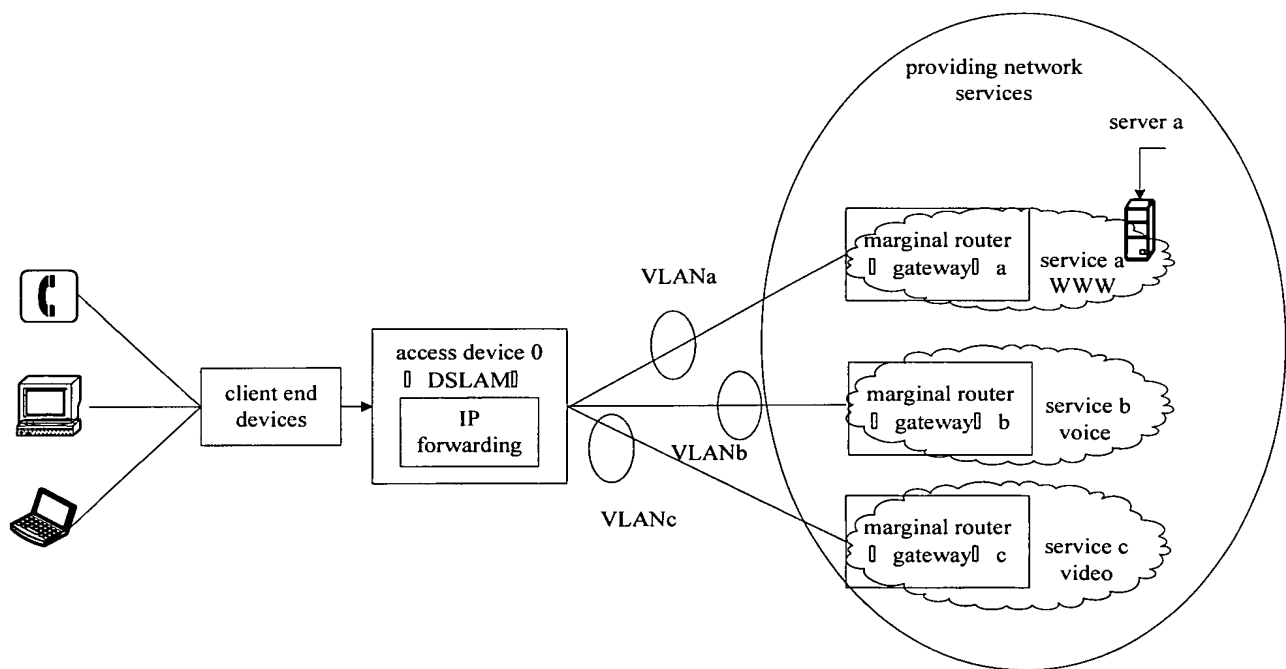


Fig. 3b

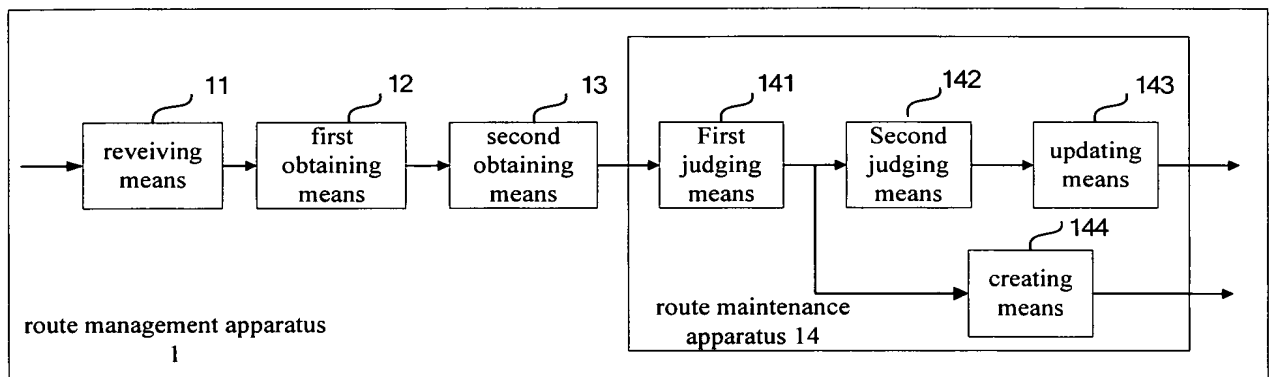


Fig. 4

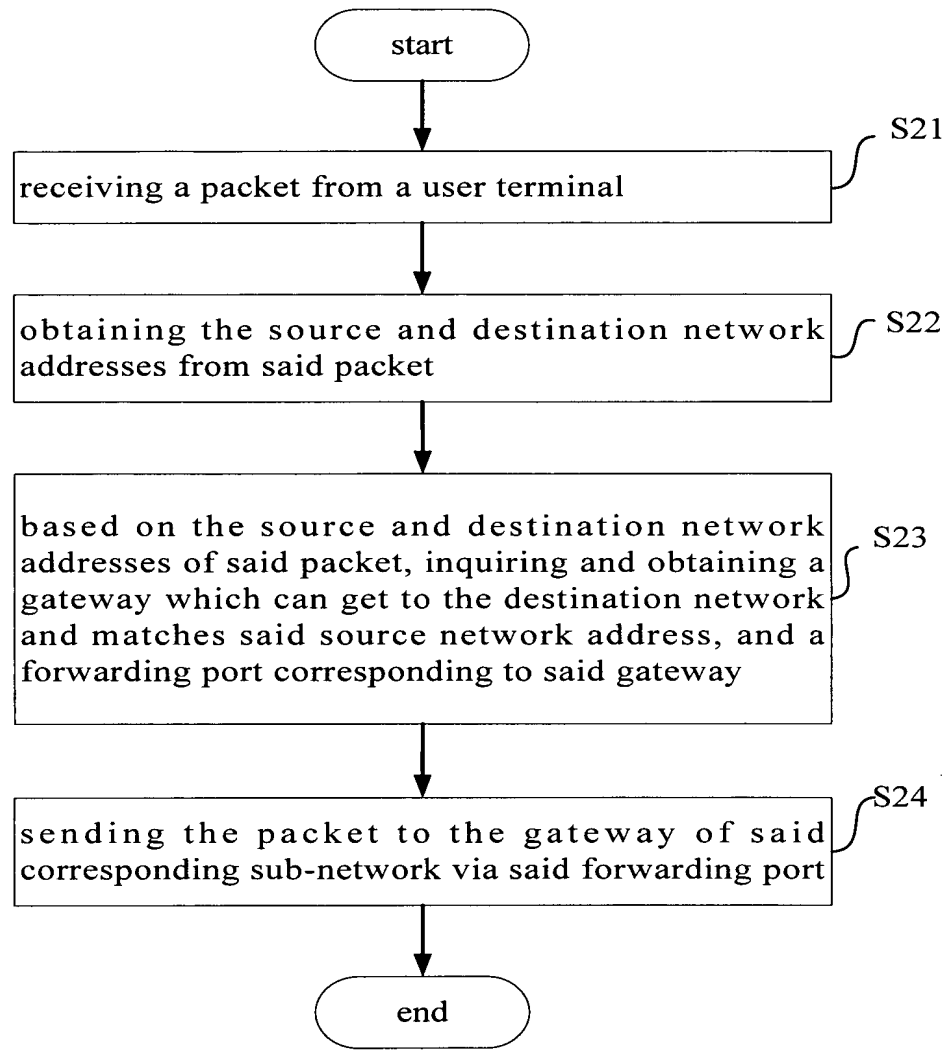


Fig. 5

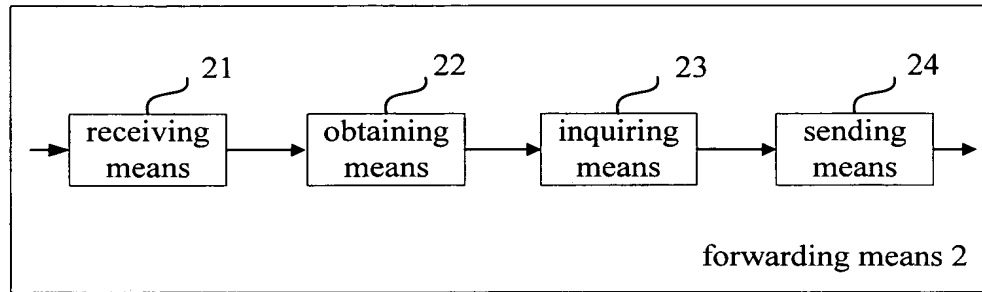


Fig. 6

12/310660

PATENT  
29250H-000013/US

## IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant(s): Qin YIN et al.

Int'l Application No.: PCT/CN2007/002449

Application No.: NEW

Filed: March 3, 2009

For: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES

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INFORMATION DISCLOSURE STATEMENT  
(SUBMISSION CONCURRENT WITH THE  
FILING OF A NEW PATENT APPLICATION)

Customer Service Window  
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March 3, 2009

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on PTO-1449, attached hereto.

II. COPIES

- ☐ Submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.
- ☒ This application is a National Phase of a PCT application. Some or all of the documents listed on the PTO-1449 are not enclosed because they were cited in the International Search Report and copies should be forwarded from the International Search Authority. If copies are needed, please contact the undersigned.

New PCT National Phase Application  
Docket No. 29250H-000013/US

- ☐ Because the present application is being filed after June 30, 2003, no copies of the U.S. patents or U.S. patent application publications which are listed on the attached Form 1449 are enclosed pursuant to the waiver of 37 C.F.R. § 1.98(a)(2)(i). Any foreign patent documents or non-patent literature listed on the attached Form 1449 are enclosed herewith.

III. CONCISE EXPLANATION OF THE RELEVANCE  
(check at least one box)

a. ☐ **DOCUMENTS IN THE ENGLISH LANGUAGE**

Some of the attached patents, publications, or other information in the English language do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Many of the documents have been discussed in the PCT Search Report and/or throughout the specification. The PCT Search Report indicates the degree of relevance found by the PCT Office, thereby satisfying the requirement for a concise explanation. See MPEP 609(A)(3).

Applicant encloses English language abstracts for Korean Patent Publication KR 10-2004-0011936 and Japanese Patent Publication JP 2002-217941.

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**

An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(A)(3).

d. ☐ **OTHER**

The following additional information is provided for the Examiner's consideration.

e. ☐ **EQUIVALENCY DOCUMENTS**

**12/310660**

New PCT National Phase Application  
Docket No. 29250H-000013/US

FEES

This Information Disclosure Statement is being filed concurrently with the filing of a new patent application; therefore, no fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 08-0750.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY & PIERCE, P.L.C.

By: \_\_\_\_\_

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Enclosures:

- ☒ Form PTO-1449(s)
- ☒ Documents
- ☒ International Search Report (PCT/ISA/210)



Form PTO-1449			ATTY DOCKET NO. 29250H-00013/US		12/310660		APPLICATION NO. NEW	
INFORMATION DISCLOSURE CITATION IN AN APPLICATION  (Use several sheets if necessary)			APPLICANTS Qin YIN et al.			CONF. NO. Unknown		
			FILING DATE March 3, 2009			GROUP Unknown		
U.S. PATENT DOCUMENTS								
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE		
	US 2002/0138614	09/26/2002	HALL					
	US 2006/0140164	06/29/2006	PATEL et al.					
FOREIGN PATENT DOCUMENTS								
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION		
						YES	NO	
	KR 10-2004-0011936	02/11/2004	Korea			Abst.		
	JP 2002-217941	08/02/2002	Japan			Abst.		
OTHER DOCUMENTS (Include Name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.								
EXAMINER				DATE CONSIDERED				
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## NETWORK ADDRESS REALLOCATING METHOD AND ROUTER

**Publication number:** JP2002217941 (A)

**Publication date:** 2002-08-02

**Inventor(s):** ISHI RYUKEN

**Applicant(s):** MATSUSHITA ELECTRIC IND CO LTD

**Classification:**

- international: **H04L12/56; H04L12/28; H04L12/46; H04L12/56; H04L12/28; H04L12/46; (IPC1-7): H04L12/56; H04L12/28; H04L12/46**

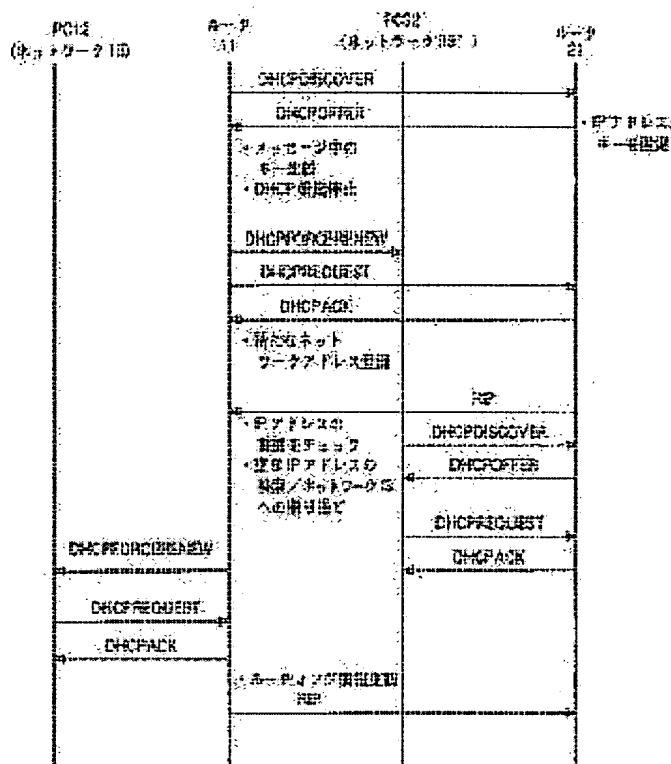
- European:

**Application number:** JP20010005480 20010112

**Priority number(s):** JP20010005480 20010112

### Abstract of JP 2002217941 (A)

**PROBLEM TO BE SOLVED:** To avoid troubles such as private IP address duplication and disabled communication, when private networks built up separately are connected. **SOLUTION:** Routers 11 and 21 conduct an election for a primary DHCP (dynamic host configuration protocol) server. After the router 21, elected to by a primary DHCP server, appends a new IP address to the router 11, the router 21 transmits a RIP message immediately to deliver the network information under its control to the router 11. The router 21 retrieves a new assignable network address from the received RIP message and assigns it to its own port connected with a network 13 and forcedly updates the IP address of a PC12. Then, the router 11 immediately updates the routing table and transmits the content of the update to the router 21 by a RIP message.



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Fターム(参考) 5K030 GA11 HA08 HCD1 HD01 HD03

HD07 KA01 KA04 KA05 KA13

WD10

5K033 AA03 AA09 CB09 CC01 DA01

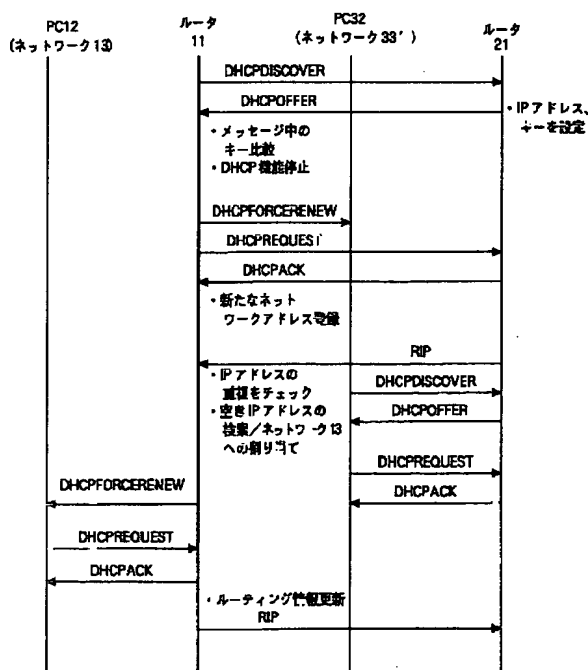
DA06 DB19 EA03 EC03

(54) 【発明の名称】 ネットワークアドレス再割り当て方法及びルータ

(57) 【要約】

【課題】 別々に構築されていたプライベートネットワークを接続した際に生じるプライベートIPアドレスの重複や通信不能といった不具合を回避すること。

【解決手段】 ルータ11とルータ21はプライマリDHCPサーバの選挙を行う。プライマリDHCPサーバとなったルータ21はルータ11に新たなIPアドレスを付与した後、直ちにRIPメッセージを送信し、配下のネットワーク情報をルータ11に伝達する。ルータ11は受信したRIPメッセージから、新たに割り当て可能なネットワークアドレスを検索しネットワーク13に接続された自ポートに割り当てるとともに、PC12のIPアドレスも強制的に更新する。さらに、ルーティングテーブルを更新し、その内容を直ちにRIPメッセージによってルータ21へ送信する。



(2) 002-217941 (P2002-217941A)

## 【特許請求の範囲】

【請求項1】 ネットワークアドレス管理機能及びダイナミックルーティング機能を備えた2以上のルータから構成されるネットワークシステムにおいて、前記ルータ間で両者間に存在するネットワークのネットワークアドレスを管理する第一のネットワークアドレス管理サーバを決定する選挙を行い、選挙に負けたルータは当該ネットワーク上でのネットワークアドレス管理機能を停止し、第一のネットワークアドレス管理サーバとなったルータは選挙に負けたルータに対して当該ネットワークに接続されたポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達することを特徴とするネットワークアドレス再割り当て方法。

【請求項2】 前記選挙に負けたルータは、第一のネットワークアドレス管理サーバから受信したダイナミックルーティングメッセージを参照して自ルータの各ポートに付与されたネットワークアドレスとの重複の有無を検査し、重複が検出された場合には、自ルータの保持するルーティング情報および前記ダイナミックルーティングメッセージに記載されたルーティング情報から空いているネットワークアドレスを検索し、前記ネットワークアドレスの重複が検出されたポートに対して検索された空きネットワークアドレスを割り当ててことを特徴とする請求項1記載のネットワークアドレス再割り当て方法。

【請求項3】 前記選挙に負けたルータは、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、当該ポートに接続されたネットワーク上の各ホストのネットワークアドレスを強制的に再割り当ててことを特徴とする請求項2記載のネットワークアドレス再割り当て方法。

【請求項4】 前記選挙に負けたルータは、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、または当該ポートに接続されたネットワーク上の各ホストのネットワークアドレス再割り当て完了後、直ちに自ルータの保持するルーティング情報の更新を行い、更新されたルーティング情報をダイナミックルーティングメッセージにより前記第一のネットワークアドレス管理サーバへ伝達することを特徴とする請求項2又は請求項3に記載のネットワークアドレス再割り当て方法。

【請求項5】 前記選挙に負けたルータは、第一のネットワークアドレス管理サーバを決定する選挙をしてから前記ダイナミックルーティングメッセージを前記第一のネットワークアドレス管理サーバへ伝達するまでの間、前記各ホストから送信されるユーザデータのルーティングを行わないことを特徴とする請求項4記載のネットワークアドレス再割り当て方法。

【請求項6】 前記選挙に負けたルータは、ネットワークアドレスの更新対象となったポートおよび各ホストに関連する構成情報を、新たに割り当てられたネットワークアドレスを基に更新することを特徴とする請求項1から請求項5のいずれかに記載のネットワークアドレス再割り当て方法。

【請求項7】 前記選挙に負けたルータは、構成情報としてネットワークアドレス変換(NAT: Network Address Translator)に関する情報を更新することを特徴とする請求項6記載のネットワークアドレス再割り当て方法。

【請求項8】 前記選挙に負けたルータは、構成情報としてプロキシ機能に関する情報を更新することを特徴とする請求項6記載のネットワークアドレス再割り当て方法。

【請求項9】 前記選挙に負けたルータは、構成情報としてQoS(Quality of Service)制御に関する情報を更新することを特徴とする請求項6記載のネットワークアドレス再割り当て方法。

【請求項10】 前記選挙に負けたルータは、構成情報としてDNS(Domain Name System)機能で使用するドメイン情報を更新することを特徴とする請求項6記載のネットワークアドレス再割り当て方法。

【請求項11】 前記選挙に負けたルータは、更新したドメイン情報を直に対向のルータに送信することを特徴とする請求項10記載のネットワークアドレス再割り当て方法。

【請求項12】 前記選挙に負けたルータは、前記各ルータの保持するドメイン情報の交換によって配下のホストにホスト名の重複が検出された際には、当該ホスト名の重複している配下のホストに対し、ホスト名の重複を通知することを特徴とする請求項11記載のネットワークアドレス再割り当て方法。

【請求項13】 前記選挙に負けたルータは、ホスト名の重複が検出されたホストに常駐しているプログラムに対してホスト名変更要求メッセージを伝達することによりホスト名の重複を通知することを特徴とする請求項12記載のネットワークアドレス再割り当て方法。

【請求項14】 前記選挙に負けたルータは、ホスト名の重複を通知したホストからホスト自ら割り当てた新たなホスト名を指定してネットワークアドレスを要求してきたら、当該新たなホスト名を基に自ルータの保持するドメイン情報を更新するとともに、前記第一のネットワークアドレス管理サーバへ前記更新されたドメイン情報を伝達することを特徴とする請求項12又は請求項13に記載のネットワークアドレス再割り当て方法。

【請求項15】 相手ルータとの間で第一のネットワークアドレス管理サーバを決定するための選挙を行い、第一のネットワークアドレス管理サーバとなったならば選挙に負けたルータに対して当該ネットワークに接続され

(3) 002-217941 (P2002-217941A)

たポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達することを特徴とするネットワークアドレス再割り当て方法。

【請求項16】 相手ルータとの間で第一のネットワークアドレス管理サーバを決定するための選挙を行い、第一のネットワークアドレス管理サーバとなったならば選挙に負けたルータに対して当該ネットワークに接続されたポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達することを特徴とするルータ。

【請求項17】 相手ルータとの間で第一のネットワークアドレス管理サーバを決定するための選挙を行い、前記選挙に負けた場合は、前記第一のネットワークアドレス管理サーバから通知されるダイナミックルーティングメッセージを参照して自ルータの各ポートに付与されたネットワークアドレスとの重複の有無を検査し、重複が検出された場合には、自ルータの保持するルーティング情報および前記ダイナミックルーティングメッセージに記載されたルーティング情報から空いているネットワークアドレスを検索し、前記ネットワークアドレスの重複が検出されたポートに対して検索された空きネットワークアドレスを割り当ててことを特徴とする請求項16記載のルータ。

【請求項18】 前記選挙に負けた場合は、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、当該ポートに接続されたネットワーク上の各ホストのネットワークアドレスを強制的に再割り当ててことを特徴とする請求項17記載のルータ。

【請求項19】 前記選挙に負けた場合は、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、または当該ポートに接続されたネットワーク上の各ホストのネットワークアドレス再割り当て完了後、直ちに自ルータの保持するルーティング情報の更新を行い、更新されたルーティング情報をダイナミックルーティングメッセージにより前記第一のネットワークアドレス管理サーバへ伝達することを特徴とする請求項17又は請求項18に記載のルータ。

【請求項20】 ホスト名を変更するプログラムが常駐し、ネットワークを管理しているルータからホスト名変更要求メッセージを受信すると、前記プログラムが自らに対し新たなホスト名を割り当て、当該新たなホスト名を指示して前記ルータから新たなネットワークアドレスを取得することを特徴とするホスト。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、SOHOネットワー

ク、集合住宅ネットワーク等のプライベートネットワーク同士を接続する際のネットワークアドレス、特にIPアドレスの再割り当て方法及びルータに関する。

【0002】

【従来の技術】現在、インターネットにおいて主流となっているネットワーク層プロトコルはIPv4 (Internet Protocol Version4) である。IPv4は電子メールやネットニュース、あるいはWWW (World Wide Web) などといったアプリケーションとともに世界中に広く普及したが、IPネットワーク上で通信装置 (ルータ、PC、サーバなど) を一意に特定するためのネットワークアドレス (以後、IPアドレスと呼ぶ) のサイズが4バイトしかないために、次第にアドレスの枯渇が問題となってきた。

【0003】このため、インターネットに接続する必要のない企業内ネットワーク (イントラネット・エクストラネットなど) では、正規のIPアドレス (以後、グローバルIPアドレスと呼ぶ) ではなく、IETF RFC1918 "Address Allocation for Private Internets" にて規定されているプライベートIPアドレスを用いるのが一般的である。この場合、企業内ネットワークの管理者はルータ、PCなど全ての通信装置に、企業内ネットワークで一意となるプライベートIPアドレスを、前記RFCに規定されたアドレス範囲内で割り当てる。

【0004】ここで、プライベートIPアドレスのみを使用して企業内ネットワークを構築する際、ネットワークが複数の拠点 (例えば東京、名古屋、大阪など) に分散している場合には、これらの拠点間を結ぶ専用線を借りる必要があり、回線費用が発生する。

【0005】一方、各拠点が最小限のグローバルIPアドレスを所有している場合には、各拠点間をインターネットで接続し、拠点間の端末がインターネットを介して通信を行う際には、それぞれの端末に割り当てられたプライベートIPアドレスと各拠点にて保持しているグローバルIPアドレスをNAT (Network Address Translator: ネットワークアドレス変換) によって変換する方法 (例えば特開平10-13471号公報) も考えられ、回線費用の削減を図ることができる。

【0006】以上は主として企業内ネットワークに関するものであったが、今後は、各家庭あるいは小規模オフィス (SOHO: Small Office Home Office) ごとに複数台のPCを所有したり、インターネットに接続する家庭内Non-PC (例えばセットトップボックスや情報家電) が普及することを考えると、家庭内においても同様なプライベートネットワークの構築が必要となってくるものと考えられる。

【0007】ここで、企業内ネットワークとSOHOネットワークとの大きな違いは、専任のネットワーク管理者の有無である。SOHOでは、各セグメントごとのネットワークアドレス、あるいは各装置ごとのIPアドレスを設計ないし設定できる管理者はいないことが普通である。そこ



(4) 002-217941 (P2002-217941A)

で、インターネットとSOHOネットワークとを相互に接続するルータは、下記のような機能をあわせ持つ、所謂ホームゲートウェイと呼ばれる装置となることが予想される。

【0008】ホームゲートウェイは、各セグメントごとのネットワークアドレス、および各装置のIPアドレスの自動割り当ておよび管理を行うDHCP (Dynamic Host Configuration Protocol) サーバ機能、各ホストに割り当てられたホスト名とプライベートIPアドレスとの対応を管理し、ドメイン名の解決を行うDNS (Domain Name System) サーバ機能を備えている。さらに、ホームゲートウェイは、インターネットとSOHOネットワークとの相互接続性、あるいはセキュリティの確保のために、次のような機能も保持することが予想される。すなわち、インターネットで使用されるグローバルIPアドレスとSOHOネットワークで使用されるプライベートIPアドレスとの相互変換を行うNAT機能、インターネットからSOHOネットワークへの不正なアクセスを遮断するファイヤウォール機能、SOHOネットワーク内の端末の代理としてインターネットにアクセスを行うプロキシ機能、送信先または送信元のIPアドレス、ポート番号、プロトコル種別などを基にパケット処理の優先度をつけるQoS制御機能、である。

【0009】ところで、SOHOネットワークで使用されるルータ（ホームゲートウェイ）が1台のみの場合には、当該ルータが全てのプライベートIPアドレスを管理するため矛盾は発生しない。しかし、IETF Draft "Mini-DHCP Election Option for DHCP"に述べられているように、複数台のルータが存在する場合には、ルータ間のネットワークアドレスを一意に決定するために、ルータ間でネゴシエーションを行う必要がある。

【0010】この一例を、図7を用いて説明する。ルータ11は、自ポートに接続されたネットワーク13に対し192.168.1.0というプライベートIPアドレスを付与している。さらに、DHCP機能により、ネットワーク13上のPC12に対しIPアドレス（例えば192.168.1.0）を付与している。同様にネットワーク23、ネットワーク33、およびこれらのネットワーク上のPC22、PC32にもプライベートIPアドレスを付与している。ルータ21についても同様である。

【0011】ここで、これらの2つのルータを、ネットワーク33とネットワーク43を結合することにより接続することを考える。なお、以後の説明は、予めネットワーク33とネットワーク43が結合された状態でルータ11、ルータ21の一方、もしくは双方がリブートした場合にも適用される。

【0012】図7においてネットワーク33とネットワーク43とを結合すると、図8に示すように、まずルータ11とルータ21との間で第一のネットワークアドレス管理サーバ（以後、プライマリDHCPサーバ）を決定する選挙が

行われる。具体的には、一方のルータ（この場合にはルータ11）から送出されたDHCPDISCOVERメッセージに対し、他方（この場合にはルータ21）が自らのIPアドレス、およびキーを設定したDHCPOFFERメッセージを返す。ここで、キーは、自らのDHCPサーバ機能により、次の要素から構成される。すなわち、既にコンフィグレーションしたホスト数、インタフェースのハードウェア種別、インタフェースに割り当てられたMACアドレスから構成される。

【0013】ルータ11は、受信したDHCPOFFERメッセージに含まれるルータ21のキーと自らのキーの大小比較を行う。このケースでは、ネットワーク33およびネットワーク43上でルータ21がコンフィグレーションしたホスト数（2）の方がルータ11のコンフィグレーションしたホスト数（1）より大きいため、ルータ11は、ネットワーク33上でのDHCP機能を停止し、自らコンフィグレーションしたPC32に対しアドレス更新を強制するためにDHCPCRERENEWメッセージを送信する。

【0014】なお、ルータ11がDHCP機能を停止するのはネットワーク33に対してのみであり、ネットワーク13およびネットワーク23に対しては、引き続きDHCP機能を実行し続ける。

【0015】引き続き、ルータ11はネットワーク33に接続された自ポートのIPアドレスを取得するため、プライマリDHCPサーバとなったルータ21に対しDHCPREQUESTメッセージを送信し、DHCPACKを受信することでアドレス取得を完了する。一方、PC32はDHCPDISCOVERメッセージにより新たなプライマリDHCPサーバ情報を取得し、プライマリDHCPサーバであるルータ21に対しDHCPREQUESTメッセージを送信することで、自らのIPアドレスを取得する。

【0016】

【発明が解決しようとする課題】以上の処理により、結合されたネットワーク33およびネットワーク43においては矛盾なくIPアドレスの再割り当てが行われる。しかし、ネットワーク全体を見てみると、図9に示すように問題が残る。

【0017】図9は前記の処理が完了した直後のネットワーク状態を示している。ネットワーク33'のみに着目するとアドレスの問題は解決しているが、ネットワーク23のネットワークアドレスは未変更のままであり、ネットワーク33'とアドレスの重複が起こっている。また、ネットワーク13とネットワーク53もアドレスが重複している。この状態では、例えばPC12からPC22に対し通信を行おうとしても、通信できないか、あるいは誤ってネットワーク33'上のPCと通信されてしまう、という問題が起こる。

【0018】本発明は、以上のような実情に鑑みてなされたもので、SOHOなどのプライベートネットワーク間の接続、あるいはネットワーク内のルータあるいはホーム

(5) 002-217941 (P2002-217941A)

ゲートウェイのリブート時に、速やかにネットワーク全体のプライベートIPアドレスの再割り当てを行うことのできるネットワークアドレス再割り当て方法及びルータを提供することを目的とする。

【0019】

【課題を解決するための手段】本発明のネットワークアドレス再割り当て方法は、ネットワークアドレス管理機能及びダイナミックルーティング機能を備えた2以上のルータから構成されるネットワークシステムにおいて、前記ルータ間で両者間に存在するネットワークのネットワークアドレスを管理する第一のネットワークアドレス管理サーバを決定する選挙を行い、選挙に負けたルータは当該ネットワーク上でのネットワークアドレス管理機能を停止し、第一のネットワークアドレス管理サーバとなったルータは選挙に負けたルータに対して当該ネットワークに接続されたポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達することを特徴とする。

【0020】これにより、複数のルータ間で第一のネットワークアドレス管理サーバを決定するための選挙を行った直後、第一のネットワークアドレス管理サーバから前記選挙に負けたルータに対し、第一のネットワークアドレス管理サーバの保持するルーティング情報が伝達されるため、前記選挙に負けたルータはただちにネットワーク全体のアドレス割り当て状態を把握し、アドレス重複を検出できる。

【0021】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、第一のネットワークアドレス管理サーバから受信したダイナミックルーティングメッセージを参照して自ルータの各ポートに付与されたネットワークアドレスとの重複の有無を検査し、重複が検出された場合には、自ルータの保持するルーティング情報および前記ダイナミックルーティングメッセージに記載されたルーティング情報から空いているネットワークアドレスを検索し、前記ネットワークアドレスの重複が検出されたポートに対して検索された空きネットワークアドレスを割り当てることを特徴とする。

【0022】また本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、当該ポートに接続されたネットワーク上の各ホストのネットワークアドレスを強制的に再割り当てすることを特徴とする。

【0023】これにより、前記選挙に負けたルータはさらに空きネットワークアドレスを検索し、ネットワークアドレスの重複が検出されたポートおよび配下のホストに対し新たなネットワークアドレスを矛盾なく付与することができる。

【0024】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、または当該ポートに接続されたネットワーク上の各ホストのネットワークアドレス再割り当て完了後、直ちに自ルータの保持するルーティング情報の更新を行い、更新されたルーティング情報をダイナミックルーティングメッセージにより前記第一のネットワークアドレス管理サーバへ伝達することを特徴とする。

【0025】これにより、前記選挙に負けたルータは、自ポートおよび配下のホストのネットワークアドレス再割り当てを行った直後、自ルータの保持するルーティング情報の更新を行い、さらに前記第一のネットワークアドレス管理サーバへ伝達するため、前記第一のネットワークアドレス管理サーバもただちに最新のルーティング情報を知ることができ、ネットワーク全体で矛盾なくネットワークアドレスが割り当てられ、ホスト間で正しく通信が行えることが保証される。

【0026】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、第一のネットワークアドレス管理サーバを決定する選挙をしてから前記ダイナミックルーティングメッセージを前記第一のネットワークアドレス管理サーバへ伝達するまでの間、各ホストから送信されるユーザデータのルーティングを行わないことを特徴とする。

【0027】これにより、前記選挙に負けたルータは、前記自ルータの保持するルーティング情報の更新処理が完了するまでユーザデータのルーティングを停止するため、誤った相手先にデータが送信される危険を防ぐことができる。

【0028】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、ネットワークアドレスの更新対象となったポートおよび各ホストに関連する構成情報を、新たに割り当てられたネットワークアドレスを基に更新することを特徴とする。

【0029】これにより、前記選挙に負けたルータは、ネットワークアドレスの更新対象となったポートおよび各ホストに関連する構成情報を、新たに割り当てられたネットワークアドレスを基に更新するため、ユーザがネットワーク構成情報の変更にとまって構成情報を修正する必要がない。

【0030】また本発明のネットワークアドレス再割り当て方法は、前記構成情報として、ネットワークアドレス変換(NAT: Network Address Translator)に関する情報、プロキシ機能に関する情報、QoS (Quality of Service) 制御に関する情報、DNS (Domain Name System) 機能で使用するドメイン情報、の少なくとも一つを更新することを特徴とする。

【0031】特に、ホームゲートウェイなど家庭内での利用を想定したルータでは専任のネットワーク管理者が

(6) 002-217941 (P2002-217941A)

いないことが普通であるため、NAT、プロキシ、QoS制御、DNSのドメイン情報が自動的に更新されることが重要である。

【0032】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、更新したドメイン情報を直ちに対向のルータに送信することを特徴とする。

【0033】これにより、複数のルータは、重複のなくなった最新のドメイン情報を直ちに取得することが可能となる。

【0034】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、前記各ルータの保持するドメイン情報の交換によって配下のホストにホスト名の重複が検出された際には、当該ホスト名の重複している配下のホストに対し、ホスト名の重複を通知することを特徴とする。

【0035】これにより、前記選挙に負けたルータは重複が検出された際にはホスト名の重複している配下のホストに対し、ホスト名の重複を通知するため、当該ホスト自身がホスト名の重複を検出することが可能である。

【0036】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、ホスト名の重複が検出されたホストに常駐しているプログラムに対してホスト名変更要求メッセージを伝達することによりホスト名の重複を通知することを特徴とする。

【0037】これにより、ホスト上で動作している常駐プログラムに対して選挙に負けたルータからはホスト名変更要求メッセージが送信され、前記常駐プログラムが新たなホスト名を割り当て、さらに自ホストの保持する構成情報のうちホスト名に関連する構成情報を自動的に更新するため、ホストの利用者（家庭内の一般ユーザ）は、ホスト名の重複を意識する必要がない。

【0038】本発明のネットワークアドレス再割り当て方法は、前記選挙に負けたルータは、ホスト名の重複を通知したホストからホスト自ら割り当てた新たなホスト名を指定してネットワークアドレスを要求してきたら、当該新たなホスト名を基に自ルータの保持するドメイン情報を更新するとともに、前記第一のネットワークアドレス管理サーバへ前記更新されたドメイン情報を伝達することを特徴とする。

【0039】これにより、前記選挙に負けたルータは自ルータの保持するドメイン情報更新後、さらに前記第一のネットワークアドレス管理サーバへ前記更新されたドメイン情報を送信するため、ネットワーク全体で、ホスト名を使用して矛盾なく（ホスト名の重複なく）通信を行うことがただちに可能となる。

【0040】本発明のネットワークアドレス再割り当て方法は、相手ルータとの間で第一のネットワークアドレス管理サーバを決定するための選挙を行い、第一のネットワークアドレス管理サーバとなったならば選挙に負け

たルータに対して当該ネットワークに接続されたポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達することを特徴とする。

【0041】これにより、複数のルータ間で第一のネットワークアドレス管理サーバを決定するための選挙を行った直後、第一のネットワークアドレス管理サーバから前記選挙に負けたルータに対し、第一のネットワークアドレス管理サーバの保持するルーティング情報が伝達されるため、前記選挙に負けたルータはただちにネットワーク全体のアドレス割り当て状態を把握し、アドレス重複を検出できる。

【0042】本発明のルータは、相手ルータとの間で第一のネットワークアドレス管理サーバを決定するための選挙を行い、第一のネットワークアドレス管理サーバとなったならば選挙に負けたルータに対して当該ネットワークに接続されたポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達することを特徴とする。

【0043】これにより、複数のルータ間で第一のネットワークアドレス管理サーバを決定するための選挙を行った直後、本ルータが第一のネットワークアドレス管理サーバとなった場合には、選挙に負けたルータに対し、第一のネットワークアドレス管理サーバの保持するルーティング情報が伝達されるため、前記選挙に負けたルータはただちにネットワーク全体のアドレス割り当て状態を把握し、アドレス重複を検出できる。

【0044】本発明のルータは、相手ルータとの間で第一のネットワークアドレス管理サーバを決定するための選挙を行い、前記選挙に負けた場合は、前記第一のネットワークアドレス管理サーバから通知されるダイナミックルーティングメッセージを参照して自ルータの各ポートに付与されたネットワークアドレスとの重複の有無を検査し、重複が検出された場合には、自ルータの保持するルーティング情報および前記ダイナミックルーティングメッセージに記載されたルーティング情報から空いているネットワークアドレスを検索し、前記ネットワークアドレスの重複が検出されたポートに対して検索された空きネットワークアドレスを割り当ててことを特徴とする。

【0045】また本発明のルータは、前記選挙に負けた場合は、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、当該ポートに接続されたネットワーク上の各ホストのネットワークアドレスを強制的に再割り当てすることを特徴とする。

【0046】これにより、選挙に負けた場合は空きネッ



(7) 002-217941 (P2002-217941A)

トワークアドレスを検索し、ネットワークアドレスの重複が検出されたポートおよび配下のホストに対し新たなネットワークアドレスを矛盾なく付与することができる。

【0047】本発明のルータは、前記選挙に負けた場合は、前記ネットワークアドレスの重複が検出されたポートのアドレス再割り当て完了後、または当該ポートに接続されたネットワーク上の各ホストのネットワークアドレス再割り当て完了後、直ちに自ルータの保持するルーティング情報の更新を行い、更新されたルーティング情報をダイナミックルーティングメッセージにより前記第一のネットワークアドレス管理サーバへ伝達することを特徴とする。

【0048】これにより、前記選挙に負けた場合は、自ポートおよび配下のホストのネットワークアドレス再割り当てを行った直後、自ルータの保持するルーティング情報の更新を行い、さらに前記第一のネットワークアドレス管理サーバへ伝達するため、前記第一のネットワークアドレス管理サーバもただちに最新のルーティング情報を知ることができ、ネットワーク全体で矛盾なくネットワークアドレスが割り当てられ、ホスト間で正しく通信が行えることが保証される。

【0049】本発明のホストは、ホスト名を変更するプログラムが常駐し、ネットワークを管理しているルータからホスト名変更要求メッセージを受信すると、前記プログラムが自らに対し新たなホスト名を割り当て、当該新たなホスト名を指示して前記ルータから新たなネットワークアドレスを取得することを特徴とする。

【0050】これにより、ホスト名の重複を通知された場合、メッセージ送信元のルータに対し、新たなホスト名を使用して再度ネットワークアドレスの要求を行うため、前記ルータは、自ルータの保持するドメイン情報を更新しホスト名の重複を解消することができる。

【0051】

【発明の実施の形態】以下、図面を参照して本発明の実施の形態について詳細に説明する。

【0052】上述した図7に示す独立した2つのプライベートネットワークを接続した場合のプライベートIPアドレス再割り当て方法を例に説明する。

【0053】図1はネットワーク33とネットワーク43とを、1つのネットワーク（ネットワーク33'）に結合した際の、各ルータおよびホスト間のシーケンスを示す図である。ルータ11およびルータ21間でDHCPDISCOVER、DHCPOFFERメッセージを利用してプライマリDHCPサーバの選挙を行うこと、選挙に敗れたルータ11はネットワーク33'上でのDHCPサーバ機能を停止すること、選挙に敗れたルータ11はDHCPREQUESTによりプライマリDHCPサーバであるルータ21に対して新たなIPアドレスの取得を要求することまでは、従来の技術の欄で説明したシーケンスと同様である。

【0054】ただし、選挙に敗れたルータ11は、この時点で、各ホストから送出されるユーザデータのルーティングは停止する。

【0055】ルータ21は、選挙に敗れたルータ11からDHCPREQUESTメッセージを受信したとき、ルータ11のネットワーク33'に接続されたポートに対するIPアドレスをDHCPACKによって付与するとともに、ただちに自ルータの保持するネットワークトポロジー情報を、ダイナミックルーティングプロトコルメッセージ（本例ではルーティングプロトコルは、小規模ネットワークで最も一般的なRIPとする）によってルータ11に伝達する。ここで、RIPメッセージには、具体的には次の内容が含まれている。すなわち、ネットワーク33'のネットワークアドレス（192.168.2.0）、およびルータ11からのホップ数（1）、ネットワーク53のネットワークアドレス（192.168.1.0）、およびルータ11からのホップ数（2）、ネットワーク63のネットワークアドレス（192.168.3.0）、およびルータ11からのホップ数（2）、が含まれる。

【0056】ルータ11は、ルータ21から上記RIPメッセージを受信することにより、これまで自分の配下にあったネットワーク13、ネットワーク23およびネットワーク33'の情報だけでなく、ネットワーク全体のトポロジー情報をただちに認識することが可能となる。このように、第一のネットワークアドレス管理サーバとなったルータ21は選挙に負けたルータ11に対して当該ネットワークに接続されたポートの新たなネットワークアドレスを付与するとともに、ダイナミックルーティングメッセージの一つであるRIPメッセージの次の通知周期が来るのを待たずに直ちに自ルータの保持するルーティング情報を前記選挙に負けたルータへ伝達するので、次の通知周期が来るのを待ってからRIPメッセージを送信する場合に比べて短時間のうちにルータ11にネットワーク全体のトポロジー情報を認識させる事ができる。

【0057】次に、ルータ11はこれまで配下にあったネットワーク13、ネットワーク23およびネットワーク33'と、新たに認識したネットワーク53、ネットワーク63との間でネットワークアドレスの重複の有無をチェックする。この例では、図9に示すように、ネットワーク13とネットワーク53、ネットワーク23とネットワーク33'がそれぞれ重複していることが分かる。

【0058】ルータ11は、ただちに、ネットワークアドレスの再割り当て処理を行う。ここでは、ネットワーク13とネットワーク53との重複の解消に着目して説明する。ルータ11は、結合されたネットワーク全体で空いている空きIPアドレスを探索する。ここでは、192.168.4.0とする。このネットワークアドレスを基に、まずネットワーク13に接続された自ルータのポートに対し適当なIPアドレス（例えば192.168.4.1）を付与する。さらに、ネットワーク13上のホストであるPC12に対しDHCPFORCERENEWメッセージを送信することにより、これまでPC

(8) 002-217941 (P2002-217941A)

12が使用していたIPアドレスを強制的に更新させる。

【0059】ネットワーク13上のPC12は、ルータ11からDHCPFORCERENEWメッセージを受信した後、ただちにネットワーク13上のDHCPサーバであるルータ11に対しDHCPREQUESTメッセージを送信し、新たなIPアドレスを要求する。

【0060】これにより、負けたルータ11はさらに空きネットワークアドレスを検索し、ネットワークアドレスの重複が検出されたポートおよび配下のホストに対し新たなネットワークアドレスを矛盾なく付与することができる。

【0061】ルータ11は、適当な空きIPアドレス（例えば192.168.4.2）を検索し、その空きIPアドレスをDHCPACKメッセージによってPC12に通知してPC12に新IPアドレスを付与する。

【0062】便宜上、図1にはネットワーク23およびPC22について記載していないが、ネットワーク13およびPC12の場合と同様の処理を行い、IPアドレスの再割り当てを行う。

【0063】配下の全てのネットワークのIPアドレス再割り当てが完了した時点で、ルータ11は自らのルーティング情報を更新し、停止していた各ホストから送出されるユーザデータのルーティングを再開する。

【0064】このように、選挙に負けたルータ11は、自ルータの保持するルーティング情報の更新処理が完了するまでユーザデータのルーティングを停止するため、誤った相手先にデータが送信される危険を防ぐことができる。

【0065】また、ルータ11は、更新されたルーティング情報をRIPメッセージによってルータ21に送信する。このように、選挙に負けたルータ11は、自ポートおよび配下のホストのネットワークアドレス再割り当てを行った直後、自ルータの保持するルーティング情報の更新を行い、さらに更新したルーティング情報をプライマリDHCPサーバとなるルータ21へ伝達するため、ルータ21もただちに最新のルーティング情報を知ることができ、ネットワーク全体で矛盾なくネットワークアドレスが割り当てられ、ホスト間で正しく通信が行えることが保証される。

【0066】以上の処理により、図9に示す過渡的なネットワーク状態が存在するものの、極めて短い時間で図2に示す最終的なネットワーク状態に移行することが可能となる。

【0067】ここで、上述したようにSOHOネットワークにおけるルータは、NAT、プロキシ、QoS制御、DNSなどの様々な機能を併せ持っているのが普通である。前記の例において、ルータ11がこれらの機能を実現するために保持している各種構成情報テーブルの一例を図3に示す。

【0068】図3において、左側がネットワークを結合

する前にルータ11が保持していたテーブルの内容である。各テーブルの内容は、次の通りである。

【0069】[NATテーブル]には、LAN側IPアドレス（ルータ11によって付与された、各ホストのプライベートIPアドレス）、WAN側IPアドレス（各ホストがインターネットにアクセスする際に使用するグローバルIPアドレス）が登録されている。[プロキシテーブル]には、LAN側IPアドレス/ポート（ルータ11に代理応答を要求するホストのIPアドレスと、ルータ11にアクセスする際に使用するポート番号）、WAN側IPアドレス/ポート（ルータ11がインターネット上のサーバに、各ホストの代理としてアクセスする際に使用するIPアドレスおよびポート番号）が登録されている。[QoSテーブル]には、送信元情報（QoS制御の対象とするパケットの送信元IPアドレス及び送信元ポート番号を指定する情報であり、指定しない場合にはDon't careとなる）、送信先情報（QoS制御の対象とするパケットの送信先IPアドレス及び送信先ポート番号を指定する情報であり、指定しない場合にはDon't careとなる）、プロトコル（QoS制御の対象とするパケットのプロトコル種別を指定する情報であり、指定しない場合にはDon't careとなる）が登録されている。[DNSテーブル]には、ホスト名（各ホストにつけられた、アルファベットおよび数字からなる、人間に分かり易い名前）、IPアドレス（各ホストに付与されたIPアドレスであり、ここではプライベートIPアドレス）が登録されている。

【0070】ルータ11は、図2に示すようにPC12、PC22、PC32のIPアドレスを再割り当てするが、それに伴って上記テーブルの内容も全て一括して変更する。更新後の各テーブルの内容を図3の右側に示す。

【0071】これにより、選挙に負けたルータ11は、ネットワークアドレスの更新対象となったポートおよび各ホストに関連する構成情報を、新たに割り当てられたネットワークアドレスを基に更新するため、ユーザがネットワーク構成情報の変更にとまって構成情報を修正する必要がない。特に、ホームゲートウェイなど家庭内での利用を想定したルータでは専任のネットワーク管理者がいないことが普通であるため、NAT、プロキシ、QoS制御、DNSのドメイン情報が自動的に更新されることが重要である。

【0072】ルータ11は、さらにルータ21と、それぞれの持つドメイン情報（DNSテーブルの内容）を相互に交換する。これにより、複数のルータは、重複のなくなった最新のドメイン情報を直ちに取得することが可能となる。

【0073】ルータ11は、自らの持つドメイン情報とルータ21の持つドメイン情報とを統合し、図4に示すような新たなDNSテーブルを作成する。

【0074】ここで、ルータ11およびルータ21の配下に同じホスト名を持つホストが存在していた場合には、ホ

(9) 002-217941 (P2002-217941A)

スト名の重複が発生する。図4の統合後のテーブルにおけるエントリNo.1および4のホスト名「taro」がそれにあたる。そこで、ルータ11は、図5に示すように、配下のホストであるPC12に常駐しているプログラムに対し、ホスト名変更要求メッセージを送信する。

【0075】これにより、選挙に負けたルータ11は重複が検出された際にはホスト名の重複している配下のホストに対し、ホスト名の重複を通知するため、当該ホスト自身がホスト名の重複を検出することが可能である。

【0076】本メッセージを受信したPC12の常駐プログラムは、図5に示すように、受信メッセージがホスト名変更要求メッセージであることを解析し、新たなホスト名（例えば taro → taro2）を割り当てる。さらに、自ホストの持つ構成情報（Windows端末であればhostファイルなど）を更新する。

【0077】これにより、ホスト名の重複を通知されたPC12上では常駐プログラムが新たなホスト名を割り当て、さらに自ホストの保持する構成情報のうちホスト名に関連する構成情報を自動的に更新するため、ホストの利用者（家庭内の一般ユーザ）は、ホスト名の重複を意識する必要がない。

【0078】PC12は、ネットワーク13上のDHCPサーバであるルータ11に対して、新たに割り当てたホスト名を設定したDHCPREQUESTメッセージを送信する。

【0079】ルータ11は、メッセージ中の新たなホスト名を取り出し、自らの持つドメイン情報を更新する。このように、重複を通知されたPC12は、選挙に負けたルータ21に対し、新たなホスト名を使用して再度ネットワークアドレスの要求を行うため、選挙に負けたルータ21は、自ルータの保持するドメイン情報を更新しホスト名の重複を解消することができる。

【0080】そして、ルータ11は、ルータ21へ変更後のドメイン情報を送信する。ルータ21は、前記通知されたドメイン情報を基に、自らのドメイン情報を更新する。以上の処理により、ルータ11、ルータ21とも、ドメイン情報を図6に示す内容に更新することができる。

【0081】このように、選挙に負けたルータ21は自ルータの保持するドメイン情報更新後、さらにプライマリ

DHCPサーバであるルータ21へ更新されたドメイン情報を送信するため、ネットワーク全体で、ホスト名を使用して矛盾なく（ホスト名の重複なく）通信を行うことがただちに可能となる。

【0082】

【発明の効果】以上詳記したように本発明によれば、S0 H0などのプライベートネットワーク間の接続、あるいはネットワーク内のルータあるいはホームゲートウェイのリブート時に、速やかにネットワーク全体のプライベートIPアドレスの再割り当てを行うことのできるネットワークアドレス再割り当て方法及びルータを提供できる。

【図面の簡単な説明】

【図1】本発明の実施の形態に係るネットワークアドレス再割り当て方法のシーケンス図

【図2】本発明の実施の形態に係るネットワークアドレス再割り当て方法を適用した後のネットワークの状態を示す図

【図3】本発明の実施の形態においてルータが保持する各種構成情報のネットワーク構成変更前後の変化を示すテーブル構成図

【図4】本発明の実施の形態においてネットワーク構成変更後にルータ間でドメイン情報を交換した後のDNSテーブルのテーブル構成図

【図5】本発明の実施の形態においてホスト名の重複を解消するためのルータおよびホスト間のシーケンス図

【図6】本発明の実施の形態においてドメイン名解消により更新されたDNSテーブルのテーブル構成図

【図7】独立した2つのプライベートネットワークを接続する前の状態を示す図

【図8】2ルータ間で第一のネットワークアドレス管理サーバの選挙を行う際のシーケンス図

【図9】独立した2つのプライベートネットワークを接続した直後の過渡的なネットワークの状態を示す図

【符号の説明】

11, 21 ルータ

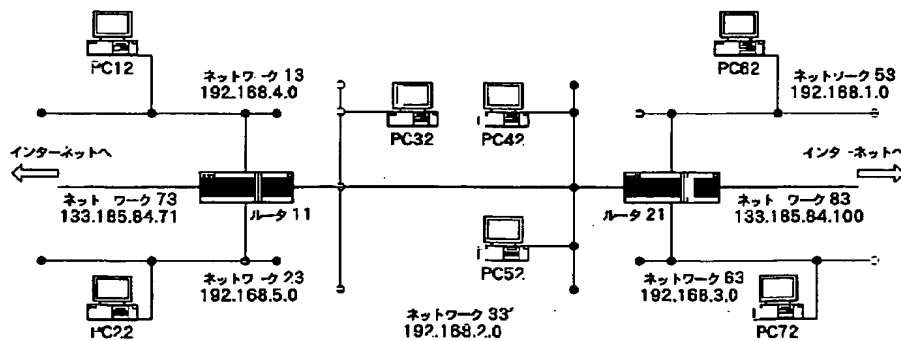
13, 23, 33, 53, 63, 73, 83 ネットワーク

12, 22, 32, 42, 52, 62, 72 ホスト

【図6】

変更 前の DNS テーブル			変更後の DNS テーブル		
No	ホスト名	IP アドレス	No	ホスト名	IP アドレス
1	taro	192.168.4.2	1	taro2	192.168.4.2
2	hanako	192.168.5.3	2	hanako	192.168.5.3
3	jiro	192.168.2.5	3	jiro	192.168.2.5
4	taro	192.168.2.3	4	taro	192.168.2.3
5	yuko	192.168.2.4	5	yuko	192.168.2.4
6	hiroshi	192.168.1.2	6	hiroshi	192.168.1.2
7	akira	192.168.3.5	7	akira	192.168.3.5

【図5】



( 1 ) 02-217941 ( P2002-217941A )

【 図 3 】

更新前のテーブル			更新後のテーブル		
NAT テーブル			NAT テーブル		
No	LAN 側 IP アドレス	WAN 側 IP アドレス	No	LAN 側 IP アドレス	WAN 側 IP アドレス
1	192.168.1.2	10.77.195.55	1	192.168.4.2	10.77.195.55
2	192.168.2.3	10.77.195.56	2	192.168.5.3	10.77.195.56
3	192.168.3.4	10.77.195.57	3	192.168.2.5	10.77.195.57

プロキシテーブル			プロキシテーブル		
No	LAN 側 IP アドレス / ポート	WAN 側 IP アドレス / ポート	No	LAN 側 IP アドレス / ポート	WAN 側 IP アドレス / ポート
1	192.168.1.2 / 8080	10.77.195.50 / 8080	1	192.168.4.2 / 8080	10.77.195.50 / 8080
2	192.168.2.3 / 4000	10.77.195.50 / 5000	2	192.168.5.3 / 4000	10.77.195.50 / 5000
3	192.168.3.4 / 1280	10.77.195.50 / 1320	3	192.168.2.5 / 1280	10.77.195.50 / 1320

QoS テーブル					QoS テーブル				
No	送信元情報	送信先情報	プロトコル	優先度	No	送信元情報	送信先情報	プロトコル	優先度
1	192.168.1.2	Don't care	Don't care	高	1	192.168.4.2	Don't care	Don't care	高
2	Don't care	192.168.2.3	Don't care	中	2	Don't care	192.168.5.3	Don't care	中
3	192.168.3.4	Don't care	RTP	低	3	192.168.2.5	Don't care	RTP	低

DNS テーブル			DNS テーブル		
No	ホスト名	IP アドレス	No	ホスト名	IP アドレス
1	taro	192.168.1.2	1	taro	192.168.4.2
2	hanako	192.168.2.3	2	hanako	192.168.5.3
3	jiro	192.168.3.4	3	jiro	192.168.2.5

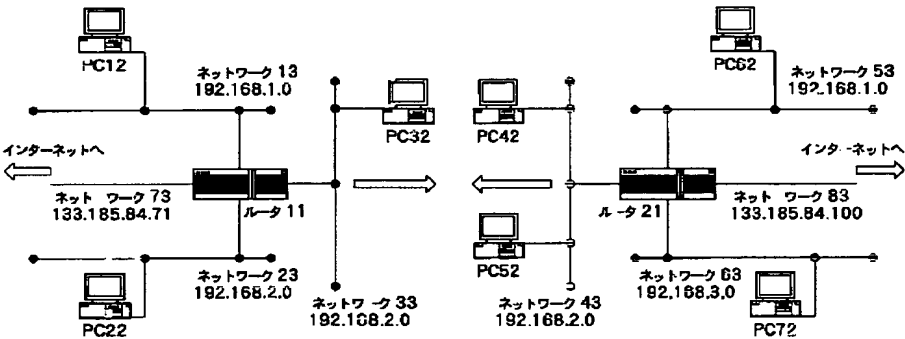
【 図 4 】

ルータ 11 の DNS テーブル		
No	ホスト名	IP アドレス
1	taro	192.168.1.2
2	hanako	192.168.2.3
3	jiro	192.168.3.4

ルータ 21 の DNS テーブル		
No	ホスト名	IP アドレス
1	taro	192.168.2.3
2	yuko	192.168.2.4
3	hiroshi	192.168.1.2
4	akira	192.168.3.5

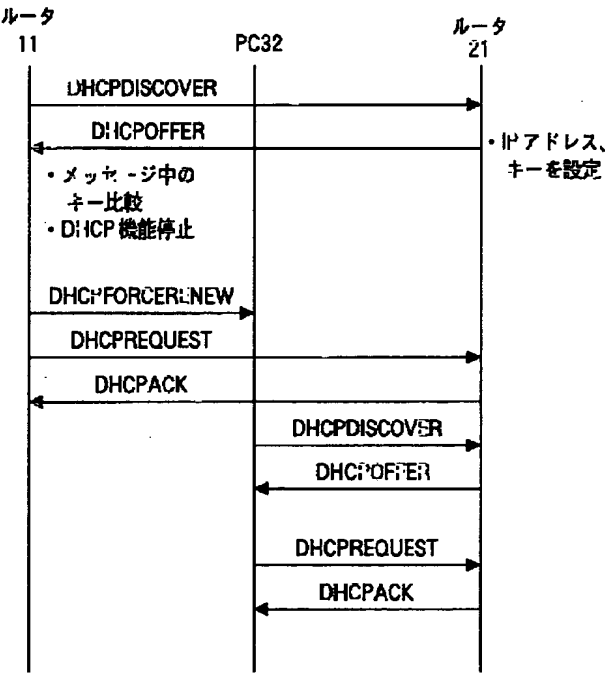
各ルータの DNS テーブル		
No	ホスト名	IP アドレス
1	taro	192.168.4.2
2	hanako	192.168.5.3
3	jiro	192.168.2.5
4	taro	192.168.2.3
5	yuko	192.168.2.4
6	hiroshi	192.168.1.2
7	akira	192.168.3.5

【 図 7 】

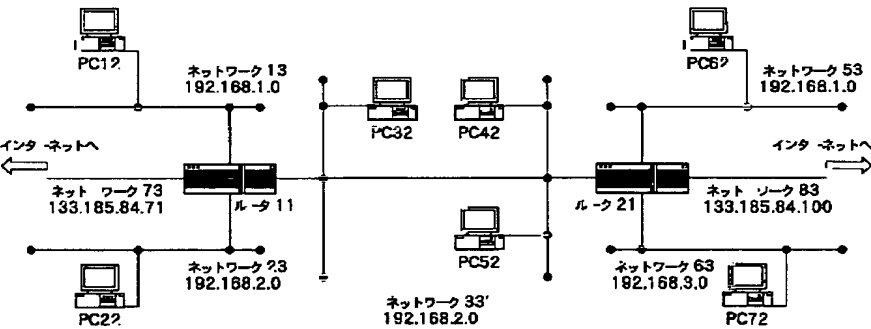


( 証 2 ) 0 2 - 2 1 7 9 4 1 ( P 2 0 0 2 - 2 1 7 9 4 1 A )

【 図 8 】



【 図 9 】



## SWITCHING DEVICE ON ETHERNET COMPOSED OF MANY VLANS AND COMMUNICATION METHOD USING THE SAME

**Publication number:** KR20040011936 (A)

**Publication date:** 2004-02-11

**Inventor(s):** JUNG TAEK JIN

**Applicant(s):** DEONET CO LTD

**Classification:**

- **international:** *H04L12/46; H04L12/46; (IPC1-7): H04L12/46*

- **European:**

**Application number:** KR20020045256 20020731

**Priority number(s):** KR20020045256 20020731

### Abstract of **KR 20040011936 (A)**

**PURPOSE:** A switching device on an Ethernet composed of many VLANs(Virtual LANs) and a communication method using the same are provided to execute an ARP(Address Resolution Protocol) response using Proxy\_ARP according to the ARP request of a source terminal connected to a VLAN, to transmit an IP packet, transmitted from the source terminal, to a destination terminal through a VLAN to which the destination terminal is connected, and to judge the validity of the destination terminal using an arbitrary subnet established in Proxy\_ARP. **CONSTITUTION:** An VLAN-based Ethernet for data transmission between different VLANs consists of a subscriber terminal group(210) having a plurality of subscriber terminals(201-204), a switching device(220), and a router(250). The switching device(220) comprises a plurality of VLANs(211-215), a Proxy-ARP module(216), and a database(217).; The subscriber terminals(201-204), divided by respectively different VLANs and connected to respective ports of the switching device(220), are provided with IP addresses from a DHCP(Dynamic Host Configuration Protocol) server through the switching device(220). The switching device(220) supports data communication between VLANs to which IP addresses have not been allocated. The Proxy-ARP module(216), based on the ARP request of a source terminal connected to a VLAN, compares whether the IP subnet of the destination terminal that the ARP request indicates is identical to an IP subnet stored in the database(217).

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(54) 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치와이를 이용한 통신 방법

요약

본 발명은 이더넷상에서 가상랜간의 데이터 통신에 관한 것으로, 특히, IP가 부여되지 않은 다수의 가상랜을 포함하는 이더넷 상에서 서로 다른 가상랜간의 데이터 통신을 지원하면서 불법으로 접속하는 단말기를 차단하는 이더넷상에서 스위칭 장치는 가입자 단말기가 IP 주소를 할당받을 때 Proxy\_ARP 설정정보를 생성하고, 서로 다른 가상랜들 중 특정 가상랜에 속한 소스 단말기로부터 다른 가상랜에 속한 목적지 단말기를 타겟으로 하는 ARP 요청이 있는 경우 소스 단말기가 속한 가상랜의 맥(MAC) 주소를 이용하여 ARP 응답을 하는 Proxy\_ARP 모듈과, 가상랜들을 관리하는 IP 서브넷과 생성된 Proxy\_ARP 설정 정보를 저장하는 데이터베이스를 더 포함하며; Proxy\_ARP는 ARP 응답에 따라 소스 단말기에서 전송된 IP 패킷을 목적지 단말기가 속한 가상랜을 통해 목적지 단말기에 전송하는 것을 특징으로 한다.

대표도

도 2

명세서

도면의 간단한 설명

도 1은 종래 기술에 따른 서로 다른 VLAN간의 데이터 전송을 위한 VLAN 방식의 이더넷 구성도,

도 2는 본 발명의 바람직한 실시예에 따른 IP 주소가 할당되지 않은 다수의 가상랜을 포함한 이더넷상에서 서로 다른 VLAN간의 데이터 전송을 위한 VLAN 방식의 이더넷 구성도,

도 3은 본 발명에 따른 IP 주소가 할당되지 않은 다수의 가상랜을 포함한 이더넷상에서 서로 다른 가상랜들간의 통신을 위한 도 2의 스위칭부에서의 동작 제어 흐름도,

도 4는 본 발명에 따른 IP 주소가 할당되지 않은 다수의 가상랜을 포함한 이더넷상에서 네트워크에 포함된 소스 단말기와 목적지 단말기간의 패킷 전송의 절차를 나타내는 흐름도이다.



## &lt;도면의 주요부분에 대한 부호의 설명&gt;

210 : 가입자 단말기 220 : 스위칭부

211 : VLAN 1 212 : VLAN 2

213 : VLAN 3 214 : VLAN 4

215 : VLAN 5 216 : Proxy\_ARP 모듈

217 : 데이터베이스 250 : 라우터

## 발명의 상세한 설명

## 발명의 목적

## 발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 이더넷(Ethernet) 네트워크 상에서의 데이터 통신에 관한 것으로, 특히 각기 동일한 IP 서브넷을 갖는 복수의 가상랜으로 이더넷 상에서 서로 다른 가상랜들간 데이터 통신을 제공하고, 설정된 IP 서브넷외의 서브넷을 갖는 단말기의 IP 통신을 막기 위한 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치와 이를 이용한 통신 방법에 관한 것이다.

통상적으로 랜(LAN: Local Area Network)은 공동의 이해 관계를 갖는 집단내부(예를 들면, 연구기관, 회사)에서 간단한 형태의 프레임 형식을 이용해 단말기간에 정보를 교환할 목적으로 사용되는 것이었으나, 매트릭스 이더넷이나 사이버 아파트와 같은 이질적인 이해관계를 갖는 불특정 다수가 랜 환경을 이용하여 인터넷을 이용하게 되면서 기존의 랜환경에서는 문제가 되지 않았던 보안의 문제가 발생되고 있다. 게다가, 기껏 수십~수백명 수준의 사용자가 동시에 이용하던 기존의 랜과 달리, 동시에 수천명 가량의 가입자를 수용할 수 있는 사이버 아파트나 MTU(Multi-Tenant Unit) 환경에서는 일상적으로 ARP요청이나 넷바이어스(Netbios) 등과 같은 브로드캐스트/멀티캐스트 패킷이 빈번히 발생하면서 랜 환경 전체의 장비와 단말기들에게 자신과 무관한 다량의 패킷을 처리해야 하는 불필요한 부담이 되었다.

상기와 같은 문제점으로 인하여 최근에 들어서는 브로드캐스트 트래픽(Broadcast traffic)에 따른 랜 성능의 저하를 방지하기 위해 라우터(Router)를 이용하여 동일 랜을 다수의 가상 랜(Virtual LAN: 이하 'VLAN'이라 함)으로 나누어 운용하는 VLAN방식 랜이 증가되고 있는 추세이다.

도 1은 종래 기술에 따른 서로 다른 VLAN간에 데이터 전송을 위해 VLAN 방식의 이더넷 구성도이다.

도 1을 참조하면, 라우터(108)나 라우팅 스위칭(110) 상에는 일반적인 프락시 ARP(Address Resolution Protocol: 이하 'ARP'이라 함) 모듈이 포함되어 있으며, 이러한 프락시 ARP 모듈은 VLAN 2(102)에 설정된 IP 서브넷을 타겟으로 하는 ARP 요청이 VLAN 1(101)에서 수신되었을 때, 이에 대한 ARP 응답을 VLAN 1(101)의 MAC(Media Access Control: 이하 'MAC' 이라함) 주소를 이용하여 응답하는 등과 같이, IP 주소가 설정된 네트워크 인터페이스간(VLAN 간)에서만 동작한다.

이러한 프락시 ARP 모듈을 이용하여 이더넷 상에서의 서로 다른 VLAN간 통신 동작을 살펴보면, VLAN 2(102)에 속한 소스 단말(111)에서 VLAN 3(103)에 속한 목적지 단말(112)로 데이터를 전송하기 위해서는 소스 단말(111)이 ARP 요청을 통해 VLAN 2(102)의 MAC 주소를 얻은 후 VLAN 2(102)에 패킷을 전송한다.

그러면, VLAN 2(102)는 패킷의 IP 주소 정보를 검출하여 분석한 후 라우팅 테이블의 검색을 통해 패킷이 VLAN 3(103)에 전송되어야함을 판단하고, 목적지 IP주소에 해당하는 목적지 단말(112)의 MAC 주소를 ARP에 의해서 습득한 후에 목적지 단말(112)에게 전송한다.

상기와 같이 서로 다른 VLAN간의 통신을 위해서는 각 VLAN에 IP 주소를 할당해 주어야 하는데, IP 주소는 관련 국제 기구를 통해 할당받아야 하는 것으로 ISP 사업자가 마음대로 무한정 할당해 줄 수 없는 유한한 자원에 해당하기 때문에 가입자 단말기들을 VLAN으로 나눌 때마다 이들간의 통신을 위해 일일이 IP 네트워크 주소를 부여해 준다는

것은 사실상 불가능하다.

또한, 망 관리자의 입장에서 볼 때, 가입자 단말기를 직접 수용하는 말단 네트워크(VLAN)가 여러 개의 IP 서브넷을 거느리는 점은 망 관리를 어렵게 하는 문제점이 있다.

다수의 가입자가 공통의 LAN 세그먼트에 연결되어 있기 때문에, 각 가입자의 단말이 전송하는 브로드캐스트 패킷의 총량이 지나치게 많아 네트워크 상에 모든 단말과 장비가 자신과 무관한 패킷을 처리해야 하는 문제점이 있다.

단말기에서 발생하는 넷바이어스 패킷이 여과없이 지나다남으로써 가입자 단말간의 보안성이 떨어지며, Win32/Nimda 웜 바이러스와 같이 랜상에 공유되어 있는 단말을 검색하여 자기 복제하는 바이러스에 의해서 가입자들은 중요한 데이터를 잃어버릴 수 있다.

#### 발명이 이루고자 하는 기술적 과제

본 발명의 목적은 이와 같은 종래 기술의 문제점을 해결하기 위한 것으로, IP가 부여되지 않은 다수의 가상랜을 포함하는 이더넷 상에서 가상랜에 포함된 소스 단말기의 ARP 요청에 따라 Proxy\_ARP를 이용하여 ARP 응답을 수행한 후에 소스 단말기에서 전송된 IP 패킷을 목적지 단말기가 속한 가상랜을 통해 목적지 단말기에게 전송하고, Proxy\_ARP에 설정된 임의의 IP 서브넷을 이용하여 데이터 통신을 요구한 목적지 단말기의 유효성을 판단하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치와 이를 이용한 통신 방법을 제공하고자 한다.

상기와 같은 목적을 달성하기 위하여 본 발명은, IP가 부여되지 않은 다수의 가상랜을 포함하는 이더넷 상에서 서로 다른 가상랜간의 데이터 통신을 위한 스위칭 장치에 있어서, 가입자 단말기가 IP 주소를 할당받을 때 Proxy\_ARP 설정정보를 생성하고, 상기 서로 다른 가상랜들 중 특정 가상랜에 속한 소스 단말기로부터 다른 가상랜에 속한 목적지 단말기를 타겟으로 하는 ARP 요청이 있는 경우 상기 소스 단말기가 속한 가상랜의 맥 주소로 이용하여 ARP 응답을 하는 Proxy\_ARP 모듈과, 상기 가상랜들을 관리하는 IP 서브넷과 상기 생성된 Proxy\_ARP 설정 정보를 저장하는 데이터베이스를 더 포함하며; 상기 Proxy\_ARP는 상기 ARP 응답에 따라 상기 소스 단말기에서 전송된 IP 패킷을 상기 목적지 단말기가 속한 가상랜을 통해 상기 목적지 단말기에 전송하는 것을 특징으로 한다.

또한, 본 발명은, 동일한 IP 서브넷을 갖고 IP가 부여되지 않은 다수의 가상랜들을 포함한 이더넷 상에서 가상랜 사이의 통신 방법에 있어서, 상기 서로 다른 가상랜들 중 특정 가상랜에 속한 소스 단말기로부터 다른 가상랜에 속한 목적지 단말기에 대한 ARP 요청을 수신하는 단계와, 상기 소스 단말기가 속한 가상랜의 맥(MAC) 주소를 이용하여 ARP 요청에 따른 ARP 응답을 상기 소스 단말기에 전송하는 단계와, 상기 ARP 응답에 따라 상기 소스 단말기로부터 IP 패킷을 수신하는 단계와, 상기 수신한 패킷을 상기 목적지 단말기가 속한 가상랜을 통해 상기 목적지 단말기에 전송하는 단계를 포함한다.

#### 발명의 구성 및 작용

이하에서 첨부한 도면을 참조하여 바람직한 실시예에 대하여 상세히 설명하기로 한다. 이 기술 분야의 숙련자라면 이 실시예를 통해 본 발명의 목적, 특징 및 이점들을 잘 이해할 수 있을 것이다.

도 2는 본 발명의 바람직한 실시예에 따른 서로 다른 VLAN간에 데이터 전송을 위해 VLAN 방식의 이더넷 구성도로써, 그 구성은 다수의 가입자 단말기(201 내지 204)를 갖는 가입자 단말기 그룹(210), 스위칭 장치(220) 및 라우터(250)로 이루어지고, 스위칭 장치(220)는 VLAN 1(211), VLAN 2(212), VLAN 3(213), VLAN 4(214), VLAN 5(215), Proxy\_ARP 모듈(216) 및 데이터베이스(217)를 포함한다.

여기서, 스위칭 장치(220)의 각 포트에 연결된 다수의 가입자 단말기(201 내지 204)는 서로 다른 VLAN으로 나누어져 있고, 스위칭 장치(220)를 통해서 도시 생략된 DHCP(Dynamic Host Configuration Protocol : 이하 'DHCP'라함) 서버로부터 IP 주소를 할당받는다. 이때 동일한 스위칭 장치(220)에 연결된 가입자 단말기(201 내지 204)의 IP 설정은 동일한 IP 서브넷을 갖도록 설정되어 있으며, 가입자 단말기(201 내지 204)와 연결된 VLAN 1 내지 VLAN 5(211 내지 215)의 가상랜은 라우터(250)와 연결된 VLAN 1(211)을 제외하고 IP 주소를 갖지 않으며 스위칭 장치(220)에 설정된 하나의 IP 서브넷에 의해서 관리된다.

스위칭 장치(220)는 새로운 Proxy\_ARP 모듈(216)이 내장된 스위치 또는 새로운 Proxy\_ARP 모듈(216)이 추가된 스위치로써, IP 주소가 할당되지 않은 VLAN 간에 데이터 통신을 지원하거나 IP 주소가 할당되지 않은 VLAN에 연결된 단말기와 IP 주소가 설정된 VLAN 상의 단말기가 동일한 IP 서브넷 설정을 유지한 상태에서 상호 통신을 가능하게 해준다.

스위칭 장치(220)에 새로이 내장된 Proxy ARP 모듈(216)은 각 가입자 단말기(201 내지 204) 중에서 VLAN 2(212)와 연결된 소스 단말기(예를 들면, 201)의 ARP 요청에 따라 ARP 요청이 가리키는 목적지 단말기(예를 들면, 203)의 IP 서브넷과 데이터베이스(217)에 저장된 IP 서브넷과 동일한지의 여부를 비교하여 통신 가능 여부를 판단하며, 판단 결과 통신 가능한 IP인 경우에 목적지 단말기(203)를 포함한 VLAN 4(214)와 통신하여 목적지 단말기(203) 연결 상태를 확인한 후에 소스 단말기(201)를 포함한 VLAN 2(212)의 MAC 주소를 이용하여 ARP 요청에 따른 응답을 대신 해준다.

라우터(250)가 연결된 VLAN 1(211)외의 모든 VLAN 상에 IP 주소를 부여하지 않은 상태에서 Proxy ARP 모듈(216)은 스위칭 장치(220)에 속한 모든 VLAN들을 데이터베이스(217)에 저장된 하나의 IP 서브넷으로 관리함으로써, 스위칭 장치(220)는 모든 포트들을 IP 주소와 상관없이 각각의 VLAN으로 나누어줄 수 있고, 이에 따라 IP 주소를 절약할 수 있을 뿐만 아니라 다수의 가입자 단말기(210)에서 발생하는 브로드캐스트/멀티캐스트 패킷들에 의해서 발생하는 트래픽을 분리시킬 수 있다.

임의의 소스 단말기(예를 들면, 201)로부터 목적지 단말기(예를 들면, 203)에 대한 ARP 요청이 있을 때, Proxy ARP 모듈(216)은 VLAN 4(214) 상에 목적지 단말기(203)가 활성상태인지를 확인하기 위한 메시지를 보낸 후에 이에 대한 응답 메시지를 수신하며, 소스 단말기(201)가 속한 VLAN 2(212)의 MAC 주소로 ARP 요청에 따른 대리 응답을 해준다.

이에 따라, ARP 요청에 따른 응답을 받은 소스 단말기(201)는 IP 패킷을 스위칭 장치(220)에 송신하며, 스위칭 장치(220)의 Proxy ARP 모듈(216)은 소스 단말기(201)에서 전송된 IP 패킷을 이용하여 IP 패킷의 목적지 주소를 이용하여 목적지 단말기(203)의 위치를 판단하고, 판단된 위치에 따라 IP 패킷을 목적지 단말기(203)가 포함된 VLAN 4(214)를 통해 목적지 단말기(203)로 전송한다.

VLAN 4(214) 상에 목적지 단말기(203)가 활성상태인지를 확인하기 위한 메시지를 보내는 이유는 ARP 대리 응답의 대상이었던 가입자 단말기가 동일 망내의 다른 스위칭 장치로 이동하였을 경우에 기존 장치의 부적절한 ARP 대리 응답이 발생하는 것을 막기 위함이다.

스위칭 장치(220)에는 각 가입자 단말기(201 내지 204)로부터 IP 주소 요구에 따라 지정된 DHCP(Dynamic Host Configuration Protocol) 서버에 접속하여 IP 주소를 할당받아 각 가입자 단말기(201 내지 204)에 IP 주소를 설정해주는 DHCP 릴레이 기능이 있으며, Proxy ARP 모듈(216)은 DHCP 릴레이 기능에 의해서 각 가입자 단말기(201 내지 204)가 할당받은 IP 주소를 실시간으로 감시하고, 각 가입자 단말기(210)의 IP 주소 할당에 따른 Proxy ARP 설정을 자동으로 생성시켜 데이터베이스(217)에 저장한다.

Proxy ARP 설정 정보로는 목적지 IP, 프락시 인터페이스(proxy interface), 쿼리 인터페이스(query interface), 게이트웨이(gateway), 목적지 IP 주소에 대응되는 단말기의 상태(status) 등이 있으며, 각 가입자 단말기(201 내지 204)의 IP 할당에 따라 자동으로 생성되거나, 스위칭 장치(220)의 관리자에 의해서 셋팅될 수 있다. 또한, Proxy ARP 설정 정보는 각 가입자 단말기(201 내지 204)의 IP 할당에 따라 자동으로 생성될 때 적어도 하나 이상 생성된다.

이러한 Proxy ARP 설정 정보를 이용하여 Proxy ARP 모듈(216)이 ARP 요청을 처리하는 과정을 간략하게 설명하면, Proxy ARP 모듈(216)은 임의의 목적지 IP를 타겟으로 하는 ARP 요청이 임의의 프락시 인터페이스 상에서 수신되면, 목적지 IP를 사용하는 해당 가입자 단말기에 대한 ARP 요청을 쿼리 인터페이스에 해당되는 VLAN 상에 전송하여 목적지 IP를 사용하는 해당 가입자 단말기가 활성 상태인지를 판단한 후에 프락시 인터페이스의 MAC 주소를 이용하여 ARP 응답을 대신 해준다.

Proxy ARP 설정 정보 중에서 게이트웨이 정보는 IP가 설정되지 않은 VLAN에 소속된 가입자 단말기(210)가 외부 네트워크로 보내는 패킷을 포워딩(forwarding) 해주기 위한 정보로써, Proxy ARP 모듈(216)은 게이트웨이 정보가 설정되어 있는 경우에 해당 가입자 단말기가 전송한 패킷을 설정된 게이트웨이를 통해 패킷을 외부네트워크로 포워딩시키고 게이트웨이 정보가 설정되어 있지 않은 경우에 해당 가입자 단말기가 전송한 패킷을 스위칭 장치(220)에서 디폴트로 설정된 게이트웨이를 통해 패킷을 외부 네트워크로 포워딩시킨다.

상기와 같은 Proxy ARP 설정 정보를 생성하고 데이터베이스(217)에 저장하는 과정을 예를 들어 설명하면 다음과 같다.

VLAN 2(212)에 연결된 가입자 단말기(201)가 DHCP 서버로부터 IP 설정 정보(예를 들어, IP=10.10.10.101, Netmask : 255.255.255.0, gateway : 10.10.10.1)를 할당받았다면, Proxy ARP 모듈(216)은 아래와 표1과 같은 Proxy ARP 설정을 생성하여 데이터베이스(217)에 저장한 후에 이를 이용하여 가입자 단말기(201)에 ARP 요청에 따른 응답을 대신해준다.

[ 표 1 ]

	목적지 IP	proxy interface	query interface	gateway	status
1	10.10.10.101/32	VLAN 1	VLAN 2	10.10.10.1	Dynamic
2	10.10.10.0/24	VLAN 2	VLAN 1	NONE	Dynamic

스위칭 장치(220)에 새로이 추가된 Proxy\_ARP 모듈(216)은 DHCP 릴레이 기능을 통해서 IP가 설정된 가입자 단말기(210)에 대해서만 Proxy\_ARP 설정을 생성함으로써, DHCP 서버를 통하지 않고 불법적으로 고정 IP를 설정하는 가입자의 네트워크 사용을 막을 수 있으며, 불법적으로 사용되는 고정 IP를 갖는 단말기와 정상적인 방법을 통해 동적으로 IP를 할당받은 가입자 단말기간의 충돌로 인하여 가입자가 인터넷을 사용하지 못하는 문제를 막을 수 있다.

데이터베이스(217)에는 Proxy\_ARP 설정뿐만 아니라 임의의 IP 서브넷이 저장되어 있는데, 임의의 IP 서브넷은 다수의 가상랜에 연결된 각 가입자 단말기(201 내지 204)의 IP 서브넷이다.

도 3은 본 발명에 따른 IP 주소가 할당되지 않은 다수의 가상랜을 포함한 이더넷상에서 서로 다른 가상랜들간의 통신을 위한 도 2의 스위칭 장치에서의 동작 제어 흐름도이고, 도 4는 본 발명에 따른 IP 주소가 할당되지 않은 할당되지 않은 다수의 가상랜을 포함한 이더넷상에서 네트워크에 포함된 소스 단말기와 목적지 단말기간의 패킷 전송의 절차를 나타내는 흐름도이다. 이하, 도 3과 도 4를 참조하여 본 발명의 실시 예를 상세히 설명한다.

이에 도시된 바와 같이, 본 발명의 스위칭 장치에서의 동작 제어를 설명함에 있어, 설명의 편의상 VLAN 2(212)에 속한 소스 단말기(201)로부터 다른 VLAN 4(214)에 속한 목적지 단말기(203)로 IP 통신 요구가 있는 경우라고 가정하고, 목적지 단말기(203)의 IP 주소를 B로, 소스 단말기(201)의 IP 주소를 A로 가정하며, VLAN 2(212)와 VLAN 4(214)는 IP 주소를 할당받지 않았다고 가정한다.

먼저, 목적지 단말기(203)로의 IP 통신을 요구하는 소스 단말기(201)가 VLAN 2(212)에 ARP 요청(목적지 단말기(203)의 MAC 주소)을 하면(S401), Proxy\_ARP 모듈(216)은 데이터베이스(217)에 저장된 Proxy\_ARP 설정 정보를 이용하여 ARP 요청에 따른 응답을 해준다.

그 절차를 보면, Proxy\_ARP 모듈(216)은 데이터베이스(217)에 목적지 단말기(203)의 IP 서브넷이 설정되어 있는지의 여부를 판단한 후에(S402, S403), 단계 S403의 판단 결과, 목적지 단말기(203)의 IP 서브넷이 설정되어 있지 않은 경우에 Proxy\_ARP 모듈(216)은 소스 단말기(201)의 ARP 요청을 무시하고 종료한다(S407). 다시 말해서, Proxy\_ARP 모듈(216)은 데이터베이스(217)에 설정되어 있지 않은 목적지 IP 주소에 대해서 ARP 응답을 해주지 않기 때문에 데이터베이스(217)에 설정된 IP 서브넷과 동일하지 않은 IP 서브넷을 갖는 단말기는 타 단말기간의 데이터 통신을 수행할 수 없다.

단계 S403에서의 판단 결과, 목적지 단말기(203)의 IP 서브넷이 데이터베이스(217)에 설정되어 있으면, Proxy\_ARP 모듈(216)은 소스 단말기(201)의 ARP 요청 메시지를 목적지 단말기(203)가 속한 VLAN 4(214)에 전송하여 목적지 단말기(203)의 활성 상태를 판단한 후에 ARP 요청에 따른 ARP 응답을 VLAN 2(212)의 MAC 주소를 이용하여 소스 단말기(201)에 응답해준다(S404).

이후, 소스 단말기(201)는 IP 패킷을 스위칭 장치(220)에 전송하는데, 이때 패킷의 목적지 MAC 주소(dstMAC)는 VLAN 2(212)로, 목적지 주소(dstIP)는 목적지 단말기(203)의 IP 주소인 B로, 소스 MAC 주소(srcMAC)와 소스 주소(srcIP)는 A로 한 IP 패킷을 VLAN 2(212)에 전송한다(S405).

Proxy\_ARP 모듈(216)은 소스 단말기(201)로부터 전송받은 IP 패킷을 분석하여 목적지 단말기(203)의 위치를 판정한 후에 목적지 단말기(203)가 포함된 VLAN 4(214)에 IP 패킷을 전송한다(S406).

VLAN 4(214)가 Proxy\_ARP 모듈(216)로부터 전송받은 IP 패킷의 헤더를 변경시키고, 헤더가 변경된 패킷을 목적지 단말기(203)에 전송함으로써 목적지 단말기(203)와 소스 단말기(201)간의 데이터 통신이 수행되는데(S407), 이때 VLAN 4(214)에서 목적지 단말기(203)에 전송되는 IP 패킷의 목적지 MAC 주소(dstMAC)는 B, 목적지 IP 주소(dstIP)는 B, 소스 MAC 주소(srcMAC)는 VLAN 4(214), 소스 IP 주소(srcIP)는 A이다.

상기와 같은 방법으로 IP 주소를 갖지 않은 VLAN 2(212)와 VLAN 4(214)에 포함된 목적지 단말기(203)와 소스 단



말기(201)간의 IP 통신을 위하여 스위칭 장치(220)에 탑재된 Proxy\_ARP 모듈(216)은 소스 단말기(201)의 목적지 단말기(203)에 대한 MAC 주소 요구에 따라 VLAN 2(212)의 MAC 주소를 이용하여 대리 응답을 해준 후에 이를 이용하여 소스 단말기(201)로부터 수신된 IP 패킷을 목적지 단말기(203)에 전송함으로써, 각 VLAN에 IP 주소의 할당 없이 가입자 단말기(210)들을 VLAN으로 나눌 수 있다.

#### 발명의 효과

이상 설명한 바와 같이, 본 발명은 가상랜에 속한 소스 단말기가 IP 주소가 설정되지 않은 가상랜에 속한 목적지 단말기로 데이터 통신을 요구할 때 임의의 IP 서브넷이 설정된 Proxy\_ARP를 이용하여 소스 단말기가 속한 가상랜의 MAC 주소를 이용하여 ARP 응답한 후에 소스 단말기에서 전송된 IP 패킷을 목적지 단말기가 속한 가상랜을 통해 목적지 단말기에 전송함으로써, 각각의 가상랜에 별도의 IP 부여함이 없이 단일 IP 서브넷을 이용하여 관리할 수 있으며, IP가 부여되지 않은 가상랜간의 통신을 지원할 수 있어 한정된 IP 자원을 절약할 수 있다.

또한, IP 주소에 상관없이 스위칭 장치의 각 포트를 가상랜으로 나눌 수 있기 때문에, 가입자 단말기간에 발생한 브로드캐스트 및 멀티캐스트 트래픽을 줄일 수 있다.

본 발명은 Proxy\_ARP 모듈의 데이터베이스에 임의의 IP 서브넷을 설정해 두었기 때문에 설정된 IP 서브넷외의 IP 서브넷을 갖는 단말기의 접속을 막을 수 있으며, DHCP 릴레이 기능을 통해 IP가 할당될 때마다 Proxy\_ARP 설정 정보를 설정하는 방식으로 가입자 단말기간의 데이터 통신을 수행함으로써, 스위칭 장치에서 지정한 DHCP 서버에서 IP를 할당받지 않고 고정 IP를 설정하여 불법적으로 네트워크에 접속하는 가입자를 막을 수 있다.

#### (57) 청구의 범위

##### 청구항 1.

IP가 부여되지 않은 다수의 가상랜을 포함하는 이더넷 상에서 서로 다른 가상랜간의 데이터 통신을 위한 스위칭 장치에 있어서,

가입자 단말기가 IP 주소를 할당받을 때 Proxy\_ARP 설정정보를 생성하고, 상기 서로 다른 가상랜들 중 특정 가상랜에 속한 소스 단말기로부터 다른 가상랜에 속한 목적지 단말기를 타겟으로 하는 ARP 요청이 있는 경우 상기 소스 단말기가 속한 가상랜의 맥 주소로 이용하여 ARP 응답을 하는 Proxy\_ARP 모듈과,

상기 가상랜들을 관리하는 IP 서브넷과 상기 생성된 Proxy\_ARP 설정 정보를 저장하는 데이터베이스를 더 포함하며;

상기 Proxy\_ARP는 상기 ARP 응답에 따라 상기 소스 단말기에서 전송된 IP 패킷을 상기 목적지 단말기가 속한 가상랜을 통해 상기 목적지 단말기에 전송하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치.

##### 청구항 2.

제 1항에 있어서,

상기 Proxy\_ARP 설정 정보는,

목적지 IP, 프락시 인터페이스, 쿼리 인터페이스, 게이트웨이를 포함하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치.

##### 청구항 3.

제 2항에 있어서,

상기 Proxy\_ARP 모듈은,

IP 주소가 설정되지 않은 가상랜 상에 존재하는 가입자 단말기가 외부 네트워크로 패킷을 전송할 때 상기 게이트웨이 정보에 해당되는 라우터를 통해 상기 패킷을 포워딩시키는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치.

##### 청구항 4.

제 1항에 있어서,

상기 Proxy\_ARP 모듈은,

상기 목적지 단말기의 IP 서브넷이 상기 데이터베이스에 설정되어 있는지의 여부를 판단하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치.

청구항 5.

제 1항에 있어서,

상기 Proxy\_ARP 모듈은,

상기 목적지 단말기가 속한 가상랜에 ARP 요청을 보내고, 이에 따른 응답 메시지를 수신한 후에 상기 소스 단말기의 ARP 요청에 따른 ARP 응답을 수행하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치.

청구항 6.

제 1항에 있어서,

상기 가입자 단말기는,

상기 스위칭 장치에서 설정한 DHCP 서버로부터 IP를 할당받는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치.

청구항 7.

동일한 IP 서브넷을 갖으며 IP가 부여되지 않은 다수의 가상랜들을 포함한 이더넷 상에서 가상랜 사이의 통신 방법에 있어서,

상기 서로 다른 가상랜들 중 특정 가상랜에 속한 소스 단말기로부터 다른 가상랜에 속한 목적지 단말기에 대한 ARP 요청을 수신하는 단계와,

상기 소스 단말기가 속한 가상랜의 맥(MAC) 주소를 이용하여 ARP 요청에 따른 ARP 응답을 상기 소스 단말기에 전송하는 단계와,

상기 ARP 응답에 따라 상기 소스 단말기로부터 IP 패킷을 수신하는 단계와,

상기 수신한 패킷을 상기 목적지 단말기가 속한 가상랜을 통해 상기 목적지 단말기에 전송하는 단계를 포함하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서 스위칭 장치의 통신 방법.

청구항 8.

제 7항에 있어서,

상기 복수의 가상랜으로 구성된 이더넷 상에서의 스위칭 장치의 통신 방법은,

상기 ARP 요청 메시지에 목적지 단말기의 IP 서브넷이 상기 스위칭 장치에 설정되어 있는지의 여부를 판단하는 단계를 더 포함하며;

상기 판단 결과에 의거하여 ARP 요청에 따른 ARP 응답을 하거나 상기 ARP 요청을 무시하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서 스위칭 장치의 통신 방법.

청구항 9.

제 7항에 있어서,

상기 ARP 요청이 수신될 때,

상기 ARP 요청 메시지를 수신할 목적지 단말기가 속한 가상랜에 ARP 요청 메시지를 송신한 후에 이에 따른 응답 메시지 수신 여부를 판단하는 단계를 더 포함하며;

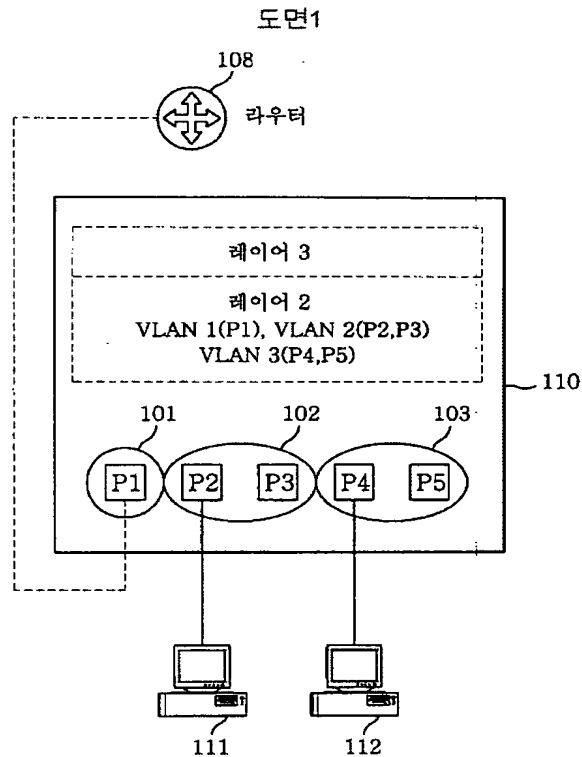
상기 판단 결과에 의거하여 상기 ARP 요청에 따른 ARP 응답 메시지를 상기 소스 단말기에 전송하는 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서 스위칭 장치의 통신 방법.

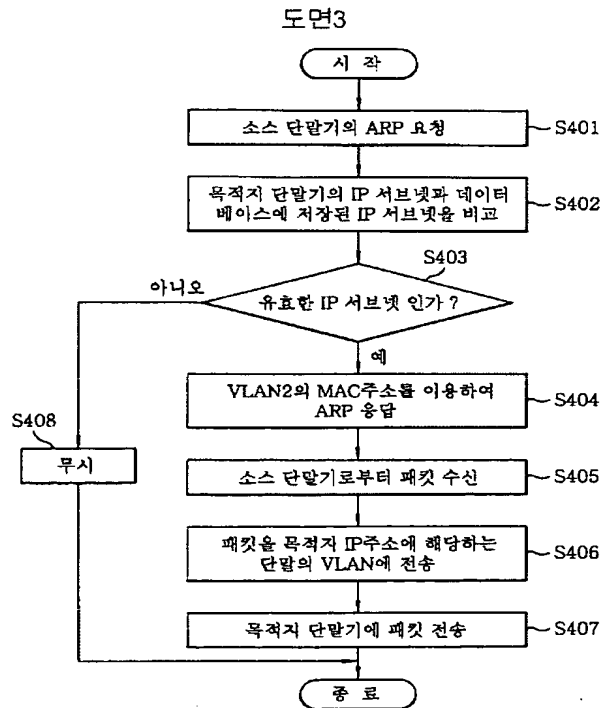
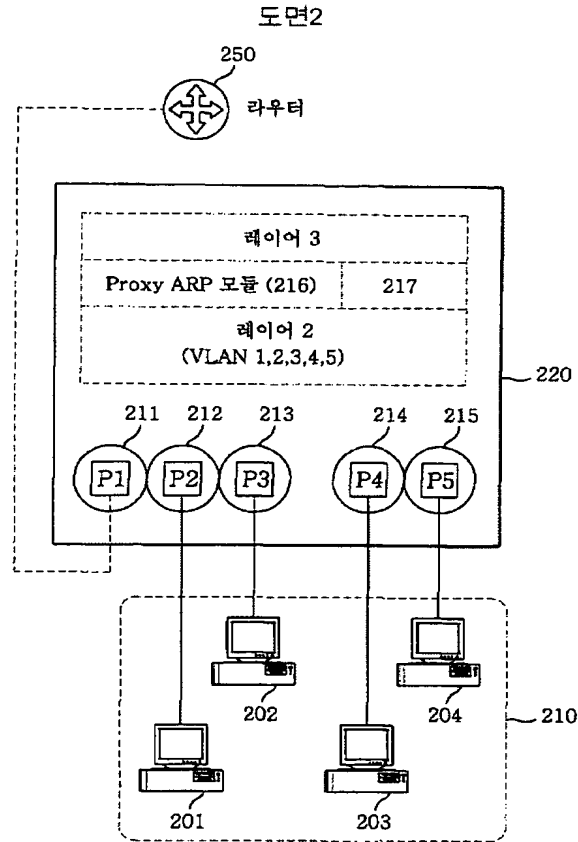
청구항 10.

제 7항에 있어서,

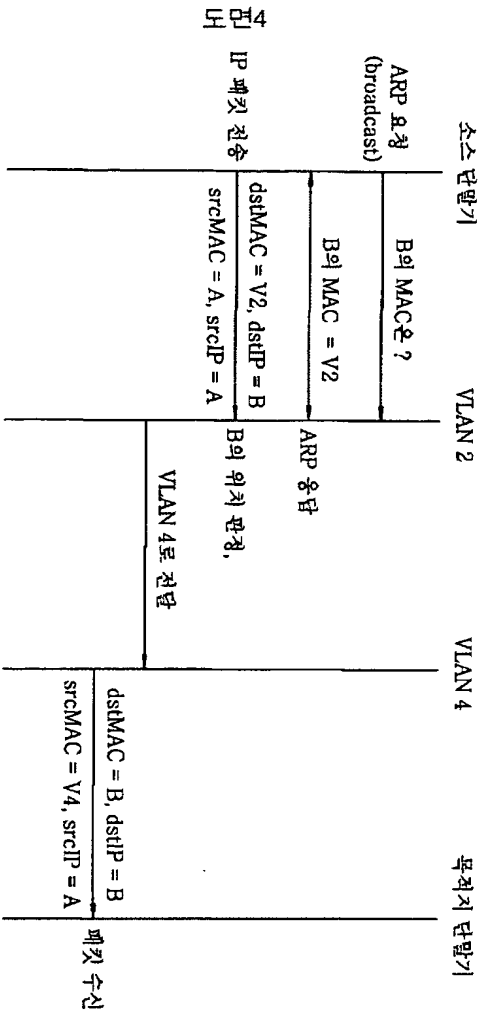
상기 소스 단말기에서 송출되는 IP 패킷의 목적지 맥 주소는 상기 소스 단말기가 속한 가상랜의 맥주소이며, 목적지 IP 주소는 상기 IP 통신을 하고자 하는 목적지 단말기의 주소인 것을 특징으로 하는 복수의 가상랜으로 구성된 이더넷 상에서 스위칭 장치의 통신 방법.

도면









## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/002449

## A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/46 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L12/00,12/28,12/46,12/54,12/58,H04Q7/00,7/06,7/24,G06F15/00, 15/16,15/163,15/173

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

see the extra sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2002138614 A1 (HALL, w. Dennis),26 September 2002(26.09.2002),	1,2,4-7,9,10,15,16
A	Paragraph [0030]-Paragraph [0043] in the description,Figs.3-6,abstract	3, 8, 11-14
Y	JP2002-217941 A(MATSUSHITA ELECTRIC IND CO., LTD.),	1,2,4-7,9,10,15,16
A	02 August 2002 (02.08.2002) , abstract, Paragraph[0019]-Paragraph[0048] in the description,Figs.1,8	3, 8, 11-14

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/CN2007/002449

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 20040011936 A (DEONET CO., LTD.), 11 February 2004(11.02.2004),	11-16
Y	abstract, Line 28 Page 3- Line 17 Page 6 in description	4,5,9,10,16
A		1-3,6-8
A	US 2006140164 A1(CISCO TECHNOLOGY, INC.), 29 June 2006(29.06.2006), The whole document	1-16

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/CN2007/002449

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows: This Authority considers that there are two inventions covered by the claims indicated as follows: claims 1-10 and claims 11-14. Claims 1-10 are directed to accessing device manages the route information with the route related information in the accessing response information; Claims 11-14 are directed to accessing device retransmits the data. The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows: the only same feature between the invention of claims 1-10 and 11-14 is the accessing device, but the accessing device is a common device in the prior art and the accessing device possess the different function in two invention. The application, hence does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT. Claims 15,16 comprise the route managing device that is one of claims 6-10 claim and/or the retransmitting device that is one of claim 13, 14, so claims 15, 16 have the unity with claims 1-10 or claims 11-14 respectively.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on protest**

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/002449

Continuation of : Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI;EPODOC;PAJ;CNKI;IEEE;CPRS..... AND KEYS:

rout???, respons???, updat???, generat???, DSLAM, DHCP, tim???, subnet, gateway, retransmit????,  
access???, table, list

**INTERNATIONAL SEARCH REPORT**  
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International application No.

PCT/CN2007/002449

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US 2002138614 A1	26.09.2002	NONE	
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US 2006140164 A1	29.06.2006	NONE	

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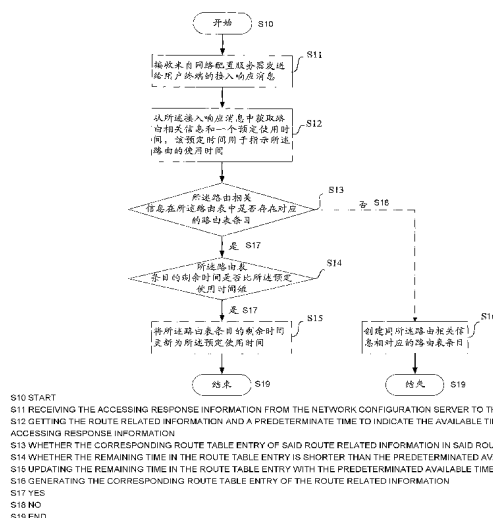
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(81) 指定国(除另有指明, 要求每一种可提供的国家保护): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY,

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(54) Title: THE METHOD AND DEVICE FOR MANAGING ROUTE INFORMATION AND RETRANSMITTING DATA IN ACCESSING DEVICE

(54) 发明名称: 接入设备中用于管理路由信息和数据转发的方法及装置



(57) Abstract: A method for generating the route according to the accessing response information in the accessing device of communication network is disclosed to differ the traffic based on the destination IP subnet and make different traffic shunt in the access device. Said method comprises the following steps: receiving the accessing response information from the server to the subscriber terminal; getting the route related information from the accessing response information; generating or updating the route table entry according to said route related information. Said method achieves the traffic shunting based on layer 3 and reduces the demand of the accessing device. Moreover, said method does not operate route protocol in layer 2 of the subscriber and reduces the demand of the border router.

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**WO 2008/031319 A1**

MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)。

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**根据细则4.17的声明:**

- 关于申请人有权要求在先申请的优先权(细则4.17(iii))
- 发明人资格(细则4.17(iv))

**本国际公布:**

- 包括国际检索报告。

**(57) 摘要:**

本发明提供一种在通信网络的接入设备中利用接入响应消息来创建路由的方法, 以实现基于目的 IP 子网进行业务区分并转发, 使不同的业务在接入设备上分流。该方法包括下列步骤: 接收来自服务器发送给用于终端的接入响应消息; 从所述接入响应消息中获取路由相关信息; 根据所述路由相关信息创建或更新路由条目。该方法实现了基于三层的业务区分并且降低了对接入设备的要求。同时, 方法还不要求用户侧二层网络运行路由协议, 降低了对边缘路由器的要求。

## 接入设备中用于管理路由信息和数据转发的方法及装置

### 技术领域

本发明涉及通信网络，尤其涉及通信网络的接入网。

5

### 背景技术

目前，电信运营商对二层接入设备的要求越来越高，需要二层设备基于三层信息进行业务区分，使得不同的业务如音频、视频和因特网等在诸如数字用户线路接入复用器（DSLAM）的接入设备上就进行分流，经过各种业务对应的网关接入相应的业务网络。具体而言，运营商通常会事先对业务网络进行规划，不同的业务供应商会拥有不同的IP地址。这样，接入设备可以基于目的IP子网进行业务区分并转发，但是一般接入设备只是二层设备，并不作为用户的网关，在三层上这些接入设备对用户透明的。并且，它们没有专属的IP地址用于数据转发，网络侧相应也就只能创建无编号IP（Unnumbered IP）接口以适应此种需求。这也是节约越来越紧张的IPv4地址提出的要求。

目前已有侦听路由协议报文来创建路由表的方法，但是通常运营商不会在用户侧端口上使能路由协议，基于链路状态的路由协议（诸如开放最短路径优先协议，Open Shortest Path First）通常要求对端拥有三层地址，这是不能满足的；基于距离向量的路由协议（诸如选路信息协议，Routing Information Protocol），虽然可用，可是对运营商路由协议的选择提出了限制，且在用户端网络运行路由协议增加了网络复杂性和二层网络负载，对二层设备提出了更高的要求，需要支持路由协议。

一般说来，二层设备很难获得三层的路由信息。静态配置每个这样的接入设备，不仅工作量非常大，而且丧失了二层设备即插即用（plug&play）的优点。这个问题由此成为了比较尖锐的问题。

本发明就是提出了一种利用终端接入网络时，服务器产生的接入响应消息来在二层设备上创建路由，用于基于目的IP子网进行业务区

分并转发的方法和装置。这里的接入响应消息是指动态主机分配协议（Dynamic Host Configuration Protocol, DHCP）响应消息。下面将对动态主机分配协议进行简单的介绍。

动态主机分配协议：

5 DHCP分为两个部分：一个是服务器端，而另一个是客户端。所有的IP网络设定资料都由DHCP服务器集中管理，并负责处理客户端的DHCP要求；而客户端则会使用从服务器分配下来的IP环境资料。

### 1. DHCP的分配形式

10 首先，必须至少有一台DHCP服务器工作在网络上，它会监听网络的DHCP请求，并与客户端磋商TCP/IP的设定环境。它提供两种IP定位方式：自动分配，其情形是：一旦DHCP客户端第一次成功的从DHCP服务器端租用到IP地址之后，就永远使用这个地址。

动态分配，当DHCP第一次从DHCP服务器端租用到IP地址之后，并非永久的使用该地址，只要租约到期，客户端就得释放(release)这个IP地址，以给其它工作站使用。当然，客户端可以比其它主机更优先的延续(renew)租约，或是租用其它的IP地址。

### 2. DHCP的工作原理

20 视乎客户端是否第一次登录网络，DHCP的工作形式会有所不同。下面参照图1对客户机第一次登录网络时DHCP工作的情形进行详细说明。

第一次登录的时候：

1) 寻找Server。当DHCP客户端第一次登录网路的时候，也就是客户发现本机上没有任何IP资料设定，它会向网络发出一个DHCPDISCOVER封包。因为客户端还不知道自己属于哪一个网络，25 所以封包的来源地址会为0.0.0.0，而目的地址则为255.255.255.255，然后再附上DHCPDISCOVER的信息，向网络进行广播。

在Windows的预设情形下，DHCPDISCOVER的等待时间预设为1秒，也就是当客户端将第一个DHCPDISCOVER封包送出去之后，在1秒之内没有得到回应的话，就会进行第二次DHCPDISCOVER广播。

若一直得不到回应的情况下，客户端一共会有四次DHCPDISCOVER广播(包括第一次在内)，除了第一次会等待1秒之外，其余三次的等待时间分别是9、13、16秒。如果都没有得到DHCP服务器的回应，客户端则会显示错误信息，宣告DHCPDISCOVER的失败。之后，基于使用者的选择，系统会继续在5分钟之后再重复一次DHCPDISCOVER的过程。

2) 提供IP租用地址。当DHCP服务器监听到客户端发出的DHCPDISCOVER广播后，它会从那些还没有租出的地址范围内，选择最前面的空置IP，连同其它TCP/IP设定，回应给客户端一个DHCPOFFER封包。

由于客户端在开始的时候还没有IP地址，所以在其DHCPDISCOVER封包内会带有其MAC地址信息，并且有一个XID编号来辨别该封包，DHCP服务器回应的DHCPOFFER封包则会根据这些资料传递给要求租约的客户。根据服务器端的设定，DHCPOFFER封包会包含一个租约期限的信息。

3) 接受IP租约。如果客户端收到网络上多台DHCP服务器的回应，只会挑选其中一个DHCPOFFER而已(通常是最先抵达的那个)，并且会向网络发送一个DHCPREQUEST广播封包，告诉所有DHCP服务器它将指定接受哪一台服务器提供的IP地址。

同时，客户端还会向网络发送一个ARP封包，查询网络上有没有其它机器使用该IP地址；如果发现该IP已经被占用，客户端则会送出一个DHCPDECLINE封包给DHCP服务器，拒绝接受其DHCPOFFER，并重新发送DHCPDISCOVER信息。

4) 租约确认。当DHCP服务器接收到客户端的DHCPREQUEST之后，会向客户端发出一个DHCPACK回应，以确认IP租约的正式生效，也就结束了一个完整的DHCP工作过程。

## 发明内容

本发明的目的是提供一种在通信网络的接入设备中利用接入响

应消息来创建路由的方法，以实现基于目的 IP 子网进行业务区分并转发，使不同的业务在接入设备上进行分流。

根据本发明的第一个方面，提供了一种在通信网络的接入设备中管理路由信息的方法，首先接收来自服务器发送给用户终端的接入响应消息，然后从所述接入响应消息中提取路由相关信息，根据所述路由相关信息创建或更新路由表。

根据本发明的第二个方面，提供一种在通信网络的接入设备中用于管理路由信息的路由管理装置。该路由管理装置包括接收装置、第一获取装置和路由维护装置。接收装置接收来自服务器端发送给终端的接入响应消息；第一获取装置从所述接入响应消息中获取所述路由相关信息；路由维护装置根据所述路由相关信息创建或更新路由表。

根据本发明的第三个方面，提供了一种在通信网络的接入设备中用于数据转发的方法，其特征在于，将来自属于不同子网的用户终端的数据转发到各自对应的子网网关。

根据本发明的第四个方面，提供了一种在通信网络的接入设备中用于数据转发的转发装置，其特征在于，将来自不同子网的用户终端的数据，转发到各自对应的子网网关。

与现有技术相比，本发明具有以下优点：

1. 不影响路由协议的选择。
2. 不要求用户侧二层网络运行路由协议。
3. 减少了对边缘路由器的要求。
4. 减少了管理员的维护工作,是实现即插即用的重要条件。
5. 在实现基于三层区分业务的前提下,降低了对接入设备的要求。

## 附图说明

通过阅读以下参照附图对非限制性实施例所作的详细描述，本发明的其它特征、目的和优点将会变得更明显。

图 1a 为动态主机配置协议的帧结构示意图；

图 1b 为动态主机配置协议帧结构中的选项结构示意图；

图 2 为根据本发明的一个具体实施方式在通信网络的接入设备中用于管理路由信息的方法流程图；

图 3a 为根据本发明的一个具体实施方式接入网的一个网络拓扑结构示意图；

图 3b 为根据本发明的一个具体实施方式接入网的另一个网络拓扑结构示意图；

图 4 为根据本发明的一个具体实施方式在通信网络的接入设备中用于管理路由信息的路由管理装置框图；

图 5 为根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的方法的流程图；

图 6 为根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的转发装置框图。

## 15 具体实施方式

图 1a 是 DHCP 包的封装格式，DHCP 的消息都封装在 UDP 数据报里，DHCP 中的选项是允许厂商定义选项(Vendor-Specific Area)，以提供更多的设定信息(如 Netmask、Gateway、DNS、等等)，其长度可变，同时可有多个选项。每个选项的第一个字节为选项代码，其后一个字节为后面项目内容的长度，最后为项目内容，如图 1b 所示的 DHCP 消息中的选项(option)格式。DHCP 利用 0x53 选项代码来设定封包类别：1 为 DHCP-DISCOVER，2 为 DHCP-OFFER，3 为 DHCP-REQUEST，4 为 DHCP-DECLINE，5 为 DHCP-ACK，6 为 DHCP-NACK，7 为 DHCP-RELEASE。

25 DHCP 标准中定义了三个静态路由相关的选项，Option 3, 33 和 121。其中 option 3 用于申明 client 对应的网关，可以是多个，按优先级顺序排列。Option 33 提出得较早，是申明静态类别路由信息的。Option 121 则是包含了前两者，申明所有的静态路由，包含默认路由，并且支持无类型域间路由。这些选项是服务器在分配 IP 地址的同时，



配置给客户端的，使客户端能正确建立起路由表。值得注意的是，对于整个网络而言，用户的网关和规划好的业务提供商的地址都是不会经常变动的，它们是位于两端的 IP 地址，是网络拓扑的端点，不会随着网络拓扑的变化而变化。所以可以认为，这些路由是静态的，可以由管理员在服务器上预先配置，配置量也是不大的。

对于接入设备，它位于边缘路由器和用户中间，也不受拓扑变化的影响。因此这些静态路由对于接入设备是足够的。

介于目前网络的现状，无类型域间路由已经被广泛使用，接入设备主要应该依靠侦听每个 DHCP-ACK 报文中的 option121 来实现上行路由的学习，维护。

下面将结合图 2 - 图 6 对本发明作进一步详细描述。

图 2 示出了根据本发明的一个具体实施方式在通信网络的接入设备中的管理路由信息的方法流程图。

首先，在步骤 S11 中，接收来自服务器发送给用户终端的接入响应消息。

然后，在步骤 S12 中，从所述接入响应消息中获取路由相关信息。

最后，根据所述路由相关信息来创建或更新路由表条目。

如果所述接入响应消息中还包括指示所述路由能够使用的时间的预定使用时间，则在步骤 S12 中，同时获取该预定使用时间；最后，同时结合所述路由相关信息和所述预定使用时间来更新或创建所述路由表条目。

其中更新或创建所述路由表条目的步骤又具体可分为步骤 S13、S14、S15 和 S16。

首先，在步骤 S13 中，判断判断所述路由相关信息在所述路由表中是否存在对应的路由表条目。

如果所述路由相关信息在所述路由表中存在对应的路由表条目，则在步骤 S14 中判断所述路由表条目的剩余时间是否比所述预定使用时间短。

如果所述路由表条目的剩余时间比所述预定使用时间短，则在步

骤 S15 中将所述路由表条目的剩余时间更新为所述预定使用时间。

如果所述路由相关信息在所述路由表中没有相对应的路由表条目，则在步骤 S16 中创建同所述路由相关信息相对应的路由表条目。

当接入设备和与其相连的各个子网网关（或者也称之为边缘路由器）之间采取虚拟局域网（VLAN）配置的时候，从地址解析协议（ARP）或者接入响应消息中获取所述路由表条目和虚拟局域网的关联信息。

图 3a 和图 3b 示出了根据本发明的一个具体实施方式接入网的两个网络拓扑结构示意图。在图 3a 中，每个虚拟局域网都有一个响应用户接入请求的服务器，在图 3b 中，三个虚拟局域网共享一个响应用户接入请求的服务器。

通常情况下，如图 3a 和图 3b 所示的网络拓扑结构图，接入设备 0 可以通过来自各个子网网关的地址解析协议的应答帧中的虚拟局域网标签中获取虚拟局域网的信息，和各个路由相关联。其详细流程如下，接入设备 0 首先接收一个来自用户设备的数据包，假设该数据包发送到服务 a 万维网中，接入设备 0 根据数据包中的源网络地址和目的网络地址从所创建的路由表中找到其转发的下一跳的目的网络地址，然后发出地址解析协议请求帧来向下一跳目的主机（在图 3a 和图 3b 中即为边缘路由器 a）查询其链路层地址。下一跳目的主机收到该请求后回应一个地址解析协议响应帧，该响应帧中包含有虚拟局域网标签。接入设备 0 接收到所述包含有虚拟局域网标签的地址解析协议响应帧时，从中提取出该虚拟局域网的信息，同该路由相关连。

如果每个虚拟局域网内部都有一个（或多个）响应用户接入请求的服务器，如图 3a 所示，在这种网络配置下，也可以通过接入响应消息中的虚拟局域网标签获取虚拟局域网的信息，从而和路由相关信息关联。如果是多个虚拟局域网共享一个响应用户接入请求的服务器，如图 3b 所示，则不能通过接入响应消息中的虚拟局域网标签获取和路由相关信息关联的虚拟局域网信息，此时只能通过地址解析协议消息来获取和路由相关信息关联的虚拟局域网信息。

在目前的网络实现中，上述接入请求消息和接入响应消息为动态



主机配置协议消息，所述预定使用时间为该动态主机配置协议响应消息中的租赁时间。

图 4 示出了根据本发明的一个具体实施方式在通信网络的接入设备中用于管理路由信息的路由管理装置 1 框图。该路由管理装置 1 包括接收装置 11、第一获取装置 12、第二获取装置 13 和路由维护装置 14。其中路由维护装置 14 包括第一判断装置 141、第二判断装置 142、更新装置 143 和创建装置 144。

首先，接收装置 11 接收来自服务器端发送给终端的接入响应消息。

10 然后，第一获取装置 12 从所述接入响应消息中获取所述路由相关信息，同时还获取一个预定使用时间，该预定时间用于指示所述路由的使用时间。

如果接入设备和与其相连的各个子网网关（或者也称之为边缘路由器）之间采取虚拟局域网配置的时候，第二获取装置 13 从地址解析协议消息或接入响应消息中获取所述路由表条目和虚拟局域网的关联信息。

通常情况下，如图 3a 和图 3b 所示，可以通过来自各个子网网关的地址解析协议的应答帧中的虚拟局域网标签中获取虚拟局域网的信息，和各个路由相关联。其详细过程如下，接入设备 0 首先接收一个来自用户设备的数据包，假设该数据包发送到服务 a 万维网中，接入设备 0 根据数据包中的源网络地址和目的网络地址从所创建的路由表中找到其转发的下一跳的目的网络地址，然后发出地址解析协议请求帧来向下一跳目的主机（在图 3a 和图 3b 中即为边缘路由器 a）查询其链路层地址。下一跳目的主机收到该请求后回应一个地址解析协议响应帧，该响应帧中包含有虚拟局域网标签。接入设备 0 接收到所述包含有虚拟局域网标签的地址解析协议响应帧时，第二获取装置 13 从中提取出该虚拟局域网的信息，同该路由相关连。

如果每个虚拟局域网内部都有一个（或多个）响应用户接入请求的服务器，如图 3a 所示，在这种网络配置下，也可以通过接入响应

消息中的虚拟局域网标签获取虚拟局域网的信息，从而和路由相关信息关联。如果是多个虚拟局域网共享一个响应用户接入请求的服务器，如图 3b 所示，则不能通过接入响应消息中的虚拟局域网标签获取和路由相关信息关联的虚拟局域网信息，此时只能通过地址解析协议消息来获取和路由相关信息关联的虚拟局域网信息。

最后，路由维护装置 14 根据所述路由相关信息创建或更新路由表。

在路由维护装置 14 的一个优选实施例中，根据第一获取装置 12 获得的路由相关信息和预定使用时间以及第二获取装置 13 获得的虚拟局域网信息，第一判断装置 141 首先判断所述路由相关信息在所述路由表中是否存在对应的路由表条目。

如果所述路由相关信息在所述路由表中存在对应的路由表条目时，第二判断装置 142 判断所述路由表条目中的剩余时间是否比所述预定使用时间短。

如果所述路由相关信息在所述路由表中存在对应的路由表条目并且所述路由表条目中的剩余时间比所述预定使用时间短，更新装置 143 将所述路由表条目的剩余时间更新为所述预定使用时间。

如果路由相关信息在所述路由表中不存在对应的路由表条目，创建装置 144 创建同所述路由相关信息相对应的路由表条目。

在目前的网络实现中，上述接入请求消息和接入响应消息为动态主机配置协议消息，所述预定使用时间为该动态主机配置协议响应消息中的租赁时间。

图 5 示出了根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的方法的流程图。该方法在于，将来自属于不同子网的用户终端的数据转发到各自对应的子网网关。如图 5 所示，该方法可分为四个步骤。

首先，在步骤 S21 中，接收来自用户终端的数据包。

其次，在步骤 S22 中，从数据包中获取源网络地址与目的网络地址。

然后，在步骤 S23 中，根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网关，及其相对应的转发端口。

最后，在步骤 S24 中，将该数据包经由所述转发端口发送给所述  
5 相应子网的网关。

在目前的网络实现中，上述网络地址为 IP 地址。

在一个优先实施例中，接入设备对于每个子网分别维护一个子网路由表。首先接收来自用户终端的数据包；其次根据所述数据包的源 IP 地址查询出其相应的子网路由表；然后根据所述数据包的目  
10 的地址从所述相应的子网路由表中查询出相应的路由表条目，从而确定所述数据包的转发端口；最后将数据包经由所述转发端口发送给所述相应子网的网关。

在另外一个优选实施例中，接入设备仅维护一个路由表。首先接收来自用户终端的数据包；其次根据所述数据包目的 IP 地址从所述  
15 路由表中查询出与所述目的地址相关的一个或多个路由表条目；然后利用所述数据包源 IP 地址来由所述与目的地址相关的一个或多个路由表条目中确定与其所属子网的网关相对应的路由表条目，并确定所述数据包的转发端口；最后将数据包经由所述转发端口发送给所述相应子网的网关。

20 图 6 示出了根据本发明的一个具体实施方式在通信网络的接入设备中用于数据转发的转发装置 2 框图。该转发装置 2 在于将来自不同子网的用户终端的数据，转发到各自对应的子网网关。

该转发装置 2 包括接收装置 21、获取装置 22、查询装置 23 和发送装置 24。

25 首先，接收装置 21 接收来自用户终端的数据包。

其次，获取装置 22 从所述数据包中获取源网络地址与目的网络地址。

然后，查询装置 23 根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网

关，及其相对应的转发端口；

最后，发送装置 24 将该数据包经由所述转发端口发送给所述相应子网的网关。

在目前的网络实现中，上述网络地址为 IP 地址。

5 在一个优选实施例中，接入设备对于每个子网分别维护一个子网路由表。首先，接收装置 21 接收来自用户终端的数据包；其次，获取装置 22 从所述数据包中获取源网络地址和目的网络地址；然后，查询装置 23 根据所述数据包的源 IP 地址查询出其相应的子网路由表；再根据所述数据包的目的 IP 地址从所述相应的子网路由表中查  
10 询出相应的路由表条目，从而确定所述数据包的转发端口；最后，发送装置 24 将数据包经由所述转发端口发送给所述相应子网的网关。

在另外一个优选实施例中，接入设备仅维护一个路由表。首先，接收装置 21 接收来自用户终端的数据包；其次，获取装置 22 从所述数据包中获取源网络地址和目的网络地址；然后，查询装置 23 根据  
15 所述数据包目的 IP 地址从所述路由表中查询出与所述目的地址相关的一个或多个路由表条目；再利用所述数据包源 IP 地址来由所述与目的地址相关的一个或多个路由表条目中确定与其所属子网的网关相对应的路由表条目，并确定所述数据包的转发端口；最后，发送装置将数据包经由所述转发端口发送给所述相应子网的网关。

20 以上对本发明的具体实施例进行了描述。需要理解的是，本发明并不局限于上述特定实施方式，本领域技术人员可以在所附权利要求的范围内做出各种变形或修改。

## 权 利 要 求

1. 一种在通信网络的接入设备中用于管理路由信息的方法，其特征在于，包括以下步骤：

5 a. 接收来自服务器发送给用户终端的接入响应消息；

b. 从所述接入响应消息中获取路由相关信息；

c. 根据所述路由相关信息创建或更新路由表条目。

2. 根据权利要求 1 所述的方法，其特征在于，所述步骤 b 还包括：

10 - 从所述接入响应消息中获取一个预定使用时间，该预定使用时间用于指示所述路由的使用时间；

其中，所述步骤 c 还包括：

- 根据所述预定使用时间来更新所述路由表条目。

3. 根据权利要求 2 所述的方法，其特征在于，所述根据所述预定时间来更新所述路由表条目的信息的步骤还包括：

15 - 判断所述路由相关信息在所述路由表中是否存在对应的路由表条目；

- 如果所述路由相关信息在所述路由表中存在对应的路由表条目，并且所述路由表条目的剩余时间比所述预定使用时间短，则将所述路由表条目的剩余时间更新为所述预定使用时间；

20 - 如果所述路由相关信息在所述路由表中没有相对应的路由表条目，则创建同所述路由相关信息相对应的路由表条目。

4. 根据权利要求 1-3 中任一项所述的方法，其特征在于，还包括以下步骤：

25 - 从地址解析协议消息或接入响应消息中获取所述路由表条目和虚拟局域网的关联信息；

其中，所述接入设备和与其相连接的各个边缘路由器之间采取所述虚拟局域网配置。

5. 根据权利要求 1-4 中任一项所述的方法，其特征在于，所述接入响应消息是指动态主机配置协议（DHCP）响应消息，所述预定



使用时间为该动态主机配置协议响应消息中的租赁时间。

6. 一种在通信网络的接入设备中用于管理路由信息的路由管理装置，其特征在于，包括：

- 接收装置，用于接收来自服务器端发送给终端的接入响应消息；
- 第一获取装置，从所述接入响应消息中获取所述路由相关信息；
- 路由维护装置，用于根据所述路由相关信息创建或更新路由表。

7. 根据权利要求 6 所述的装置，其特征在于，所述获取装置还用于从所述接入响应消息中获取一个预定使用时间，该预定时间用于指示所述路由的使用时间；

其中，所述路由维护装置还根据所述预定使用时间来更新所述路由表条目。

8. 根据权利要求 6 或 7 所述的装置，其特征在于，所述路由维护装置包括：

- 第一判断装置，用于判断所述路由相关信息在所述路由表中是否存在对应的路由表条目；

- 第二判断装置，用于判断当所述路由相关信息在所述路由表中存在对应的路由表条目时，所述路由表条目中的剩余时间是否比所述预定使用时间短；

- 更新装置，用于当所述路由相关信息在所述路由表中存在对应的路由表条目并且所述路由表条目中的剩余时间比所述预定使用时间短时，将所述路由表条目的剩余时间更新为所述预定使用时间；

- 创建装置，用于当路由相关信息在所述路由表中不存在对应的路由表条目时，创建同所述路由相关信息相对应的路由表条目。

9. 根据权利要求 6-8 中任一项所述的装置，其特征在于，还包括：

第二获取装置，用于从地址解析协议消息或接入响应消息中获取所述路由表条目和虚拟局域网的关联信息；

其中，所述接入设备和与其相连接的各个边缘路由器之间采取所述虚拟局域网配置。

10. 根据权利要求 6-9 中任一项所述的装置，其特征在于，所述接入响应消息是指动态主机配置协议（DHCP）响应消息，所述预定使用时间为该动态主机配置协议响应消息中的租赁时间。

11. 一种在通信网络的接入设备中用于数据转发的方法，其特征在于，将来自属于不同子网的用户终端的数据转发到各自对应的子网网关。

12. 根据权利要求 11 所述的方法，其特征在于，包括以下步骤：

i. 接收来自用户终端的数据包；

ii. 由所述数据包中获取源网络地址与目的网络地址；

10 iii. 根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网关，及其相对应的转发端口；

iv. 将该数据包经由所述转发端口发送给所述相应子网的网关。

15 13. 一种在通信网络的接入设备中用于数据转发的转发装置，其特征在于，将来自不同子网的用户终端的数据，转发到各自对应的子网网关。

14. 根据权利要求 13 所述的装置，其特征在于，包括：

接收装置，用于接收来自用户终端的数据包；

20 获取装置，用于由所述数据包中获取源网络地址与目的网络地址；

查询装置，用于根据所述数据包的源网络地址与目的网络地址，从路由表中查询出可以到达目的网络并且与源网络地址匹配的网关，及其相对应的转发端口；

25 发送装置，用于将该数据包经由所述转发端口发送给所述相应子网的网关。

15. 一种通信网络中的接入设备，其特征在于，包含权利要求 6 - 10 中任一项所述的路由管理装置或/和权利要求 13 或 14 所述的转发装置。

30 16. 根据权利要求 15 中所述的设备，其特征在于，该接入设备为数字用户线路接入复用器(DSLAM)。

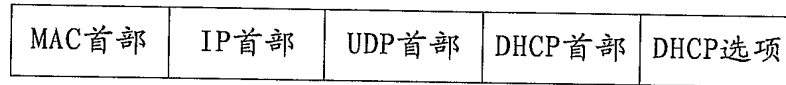


图 1a

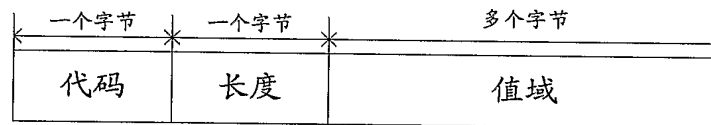


图 1b



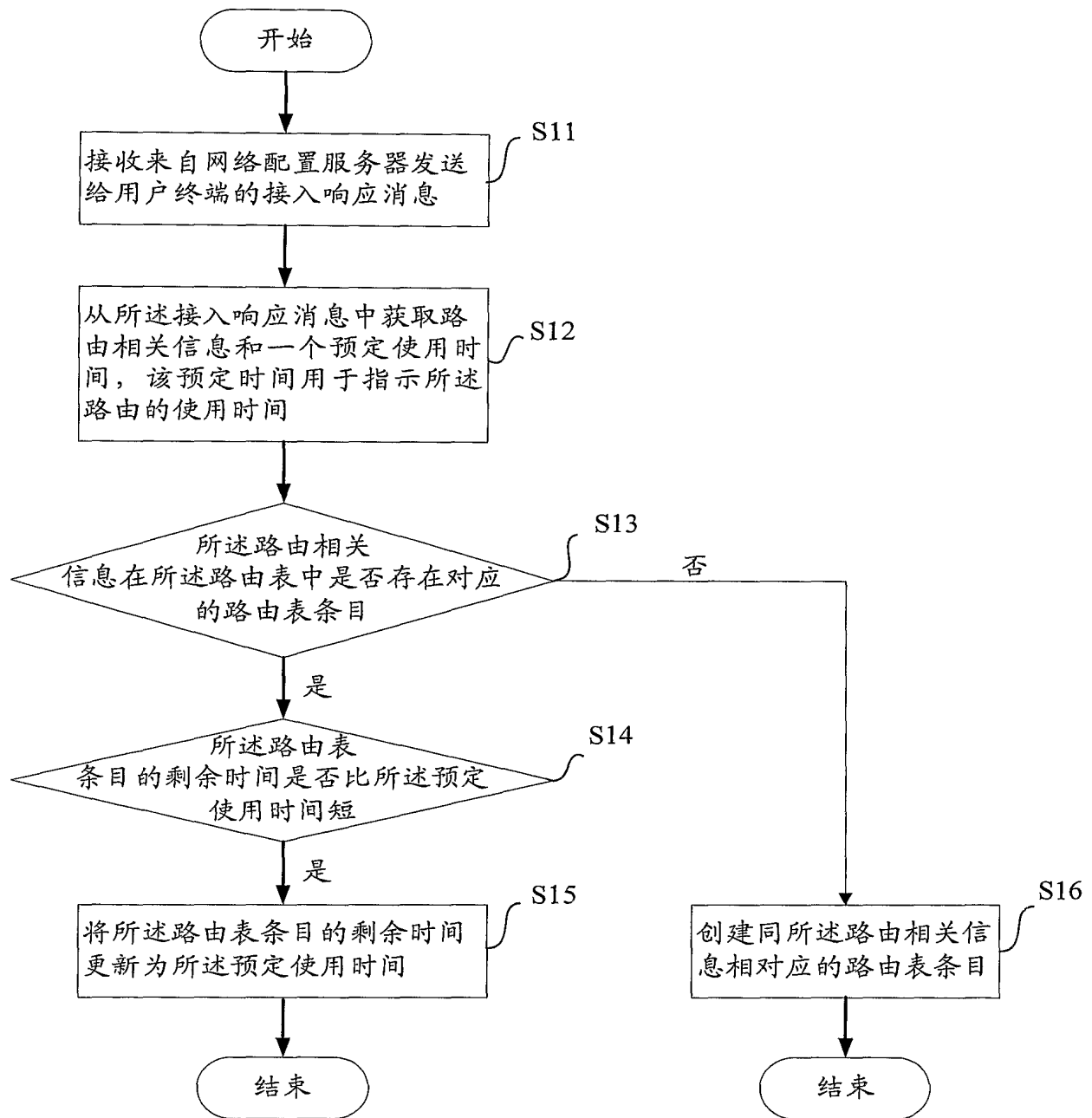


图 2

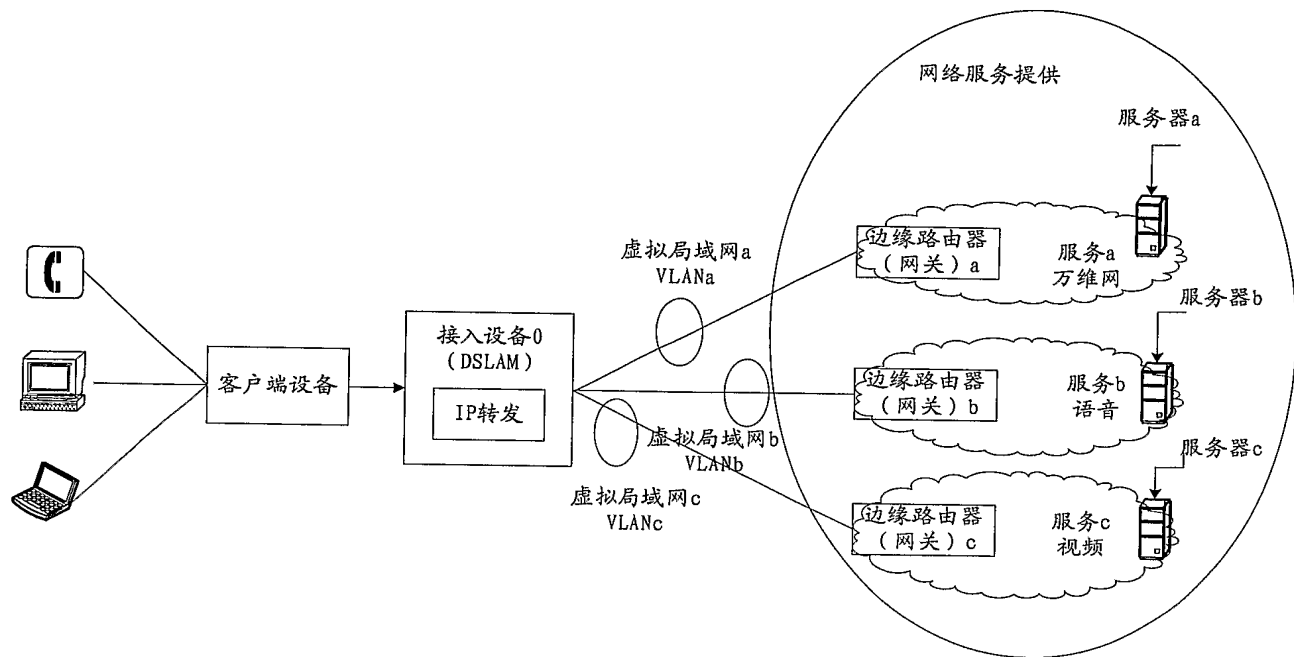


图 3a

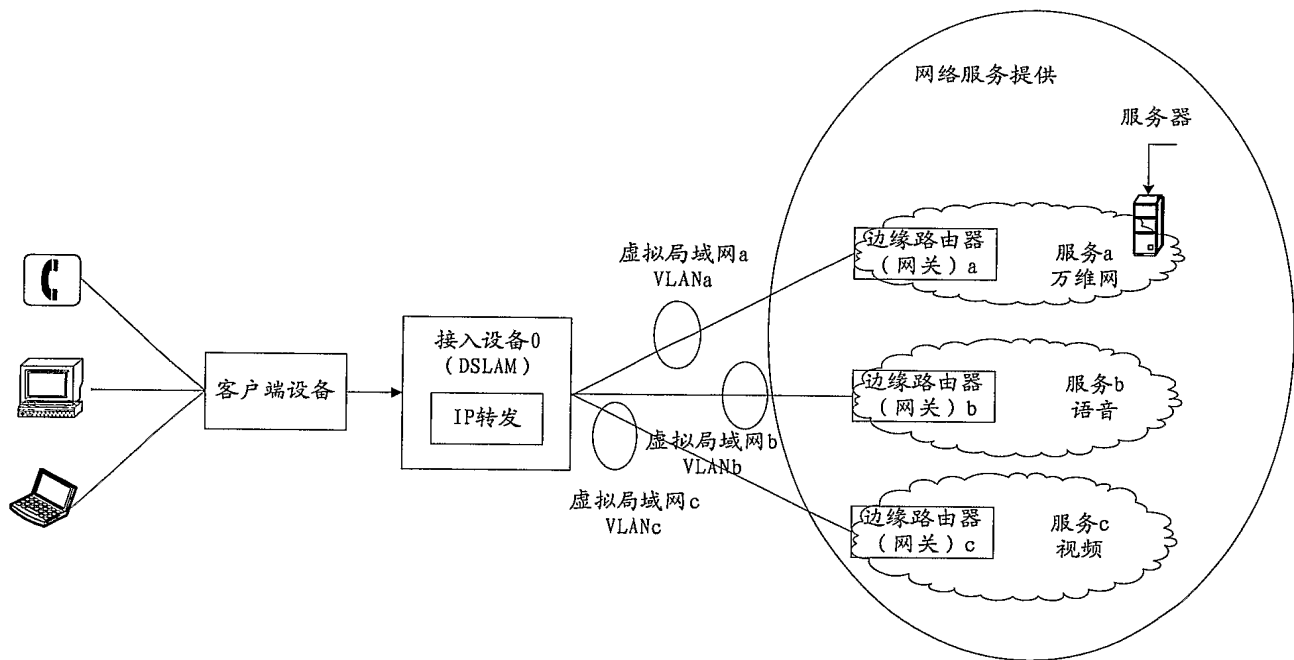


图 3b

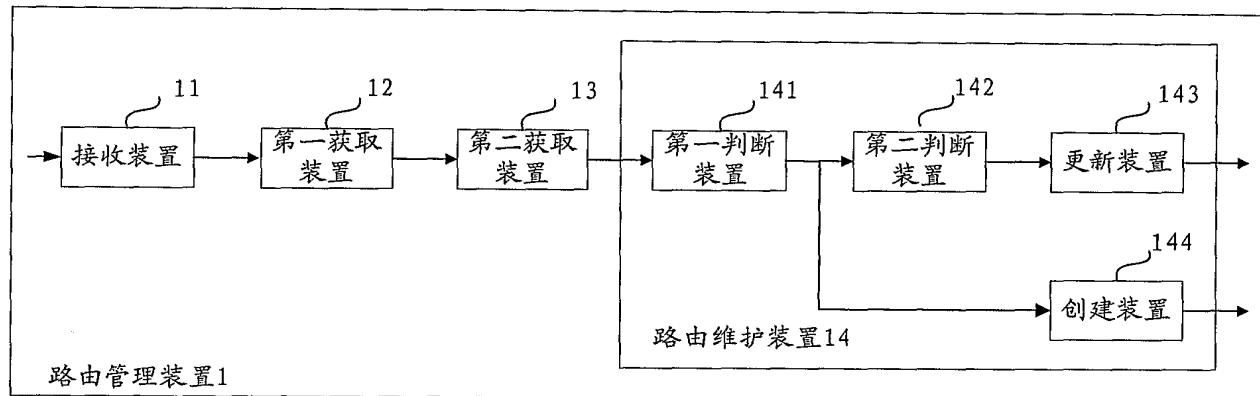


图 4

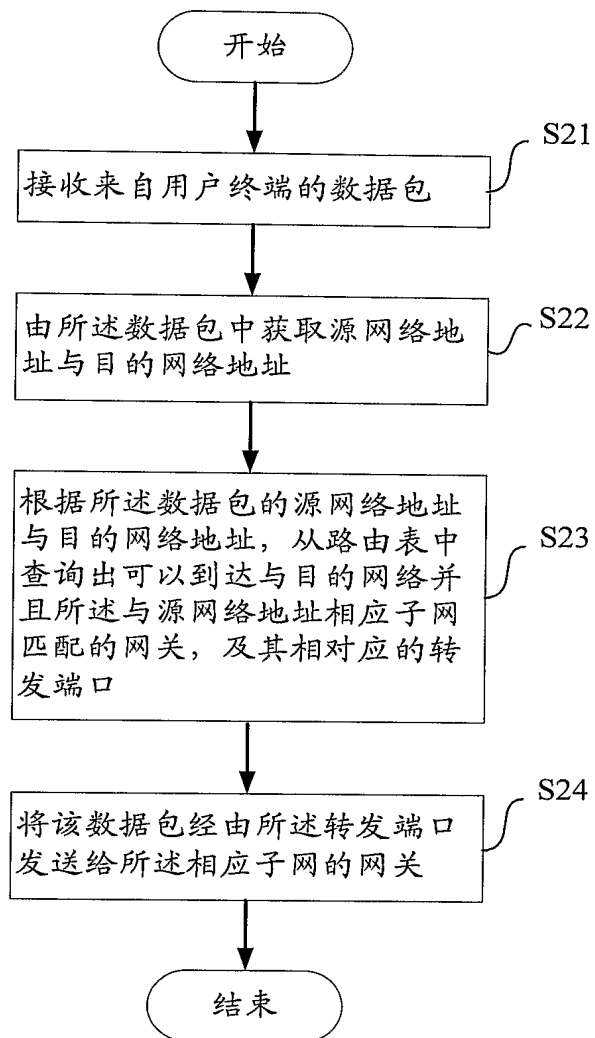


图 5

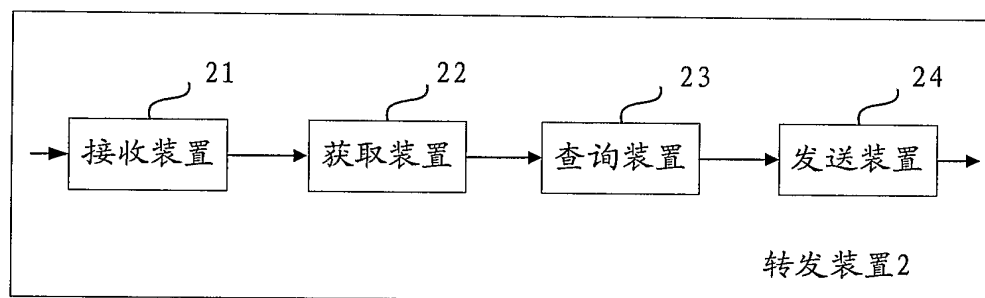


图 6

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/CN2007/002449

**A. CLASSIFICATION OF SUBJECT MATTER**

H04L 12/46 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L12/00,12/28,12/46,12/54,12/58,H04Q7/00,7/06,7/24,G06F15/00, 15/16,15/163,15/173

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

see the extra sheet

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2002138614 A1 (HALL, w. Dennis),26 September 2002(26.09.2002),	1,2,4-7,9,10,15,16
A	Paragraph [0030]-Paragraph [0043] in the description,Figs.3-6,abstract	3, 8, 11-14
Y	JP2002-217941 A(MATSUSHITA ELECTRIC IND CO., LTD.),	1,2,4-7,9,10,15,16
A	02 August 2002 (02.08.2002) , abstract, Paragraph[0019]-Paragraph[0048] in the description,Figs.1,8	3, 8, 11-14

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&amp;”document member of the same patent family

Date of the actual completion of the international search  
11 October 2007 (11. 10. 2007)Date of mailing of the international search report  
01 Nov. 2007 (01.11.2007)Name and mailing address of the ISA/CN  
The State Intellectual Property Office, the P.R.China  
6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China  
100088  
Facsimile No. 86-10-62019451Authorized officer  
GUO,Fengshun  
Telephone No. (86-10)82755435

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/CN2007/002449

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 20040011936 A (DEONET CO., LTD.), 11 February 2004 (11.02.2004),	11-16
Y	abstract, Line 28 Page 3- Line 17 Page 6 in description	4,5,9,10,16
A		1-3,6-8
A	US 2006140164 A1 (CISCO TECHNOLOGY, INC.), 29 June 2006 (29.06.2006), The whole document	1-16

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/CN2007/002449

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows: This Authority considers that there are two inventions covered by the claims indicated as follows: claims 1-10 and claims 11-14. Claims 1-10 are directed to accessing device manages the route information with the route related information in the accessing response information; Claims 11-14 are directed to accessing device retransmits the data. The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows: the only same feature between the invention of claims 1-10 and 11-14 is the accessing device, but the accessing device is a common device in the prior art and the accessing device possess the different function in two invention. The application, hence does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT. Claims 15,16 comprise the route managing device that is one of claims 6-10 claim and/or the retransmitting device that is one of claim 13, 14, so claims 15, 16 have the unity with claims 1-10 or claims 11-14 respectively.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

- Remark on protest**
- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/002449

Continuation of : Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI;EPODOC;PAJ;CNKI;IEEE;CPRS..... AND KEYS:

rout???, respons???, updat???, generat???, DSLAM, DHCP, tim???, subnet, gateway, retransmit???,  
access???, table, list

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.  
PCT/CN2007/002449

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US 2002138614 A1	26.09.2002	NONE	
JP 2002-217941 A	02.08.2002	NONE	
KR 20040011936 A	11.02.2004	US 2005184780 A1	25.08.2005
		US 7142028 B	28.11.2006
		KR20050083423 A	26.08.2005
		CN 1661918 A	31.08.2005
		TW260859B B	21.08.2006
US 2006140164 A1	29.06.2006	NONE	

## 国际检索报告

国际申请号

PCT/CN2007/002449

## A. 主题的分类

H04L 12/46 (2006.01) i

按照国际专利分类表(IPC)或者同时按照国家分类和 IPC 两种分类

## B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC: H04L12/00,12/28,12/46,12/54,12/58,H04Q7/00,7/06,7/24,G06F15/00, 15/16,15/163,15/173

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称, 和使用的检索词(如使用))

参见附加页

## C. 相关文件

类 型*	引用文件, 必要时, 指明相关段落	相关的权利要求
Y	US 2002138614 A1 (HALL, w. Dennis), 26.9 月 2002(26.09.2002), 说明书第[0030]段-第[0043]段, 附图 3-6, 说明书摘要	1,2,4-7,9,10,15,16
A		3, 8, 11-14
Y	JP 2002-217941 A(松下电器产业株式会社),02.8 月 2002(02.08.2002), 说明书摘要, 说明书第[0019]段-第[0048]段, 附图 1, 8	1,2,4-7,9,10,15,16
A		3, 8, 11-14
X	KR 20040011936 A (DEONET CO., LTD.), 11.2 月 2004(11.02.2004), 说明书摘要, 说明书第 3 页第 28 行-第 6 页第 17 行, 附图 1-4	11-16
Y		4,5,9,10,16
A		1-3,6-8
A	US 2006140164 A1 (CISCO TECHNOLOGY, INC.), 29.6 月 2006(29.06.2006), 全文	1-16

☐ 其余文件在 C 栏的续页中列出。☒ 见同族专利附件。

\* 引用文件的具体类型:

“A” 认为不特别相关的表示了现有技术一般状态的文件

“E” 在国际申请日的当天或之后公布的在先申请或专利

“L” 可能对优先权要求构成怀疑的文件, 或为确定另一篇  
引用文件的公布日而引用的或者因其他特殊理由而引  
用的文件

“O” 涉及口头公开、使用、展览或其他方式公开的文件

“P” 公布日先于国际申请日但迟于所要求的优先权日的文件

“T” 在申请日或优先权日之后公布, 与申请不相抵触, 但为了  
理解发明之理论或原理的在后文件“X” 特别相关的文件, 单独考虑该文件, 认定要求保护的  
发明不是新颖的或不具有创造性“Y” 特别相关的文件, 当该文件与另一篇或者多篇该类文件  
结合并且这种结合对于本领域技术人员为显而易见时,  
要求保护的发明不具有创造性

“&amp;” 同族专利的文件

国际检索实际完成的日期

11.10 月 2007(11.10.2007)

国际检索报告邮寄日期

01.11 月 2007(01.11.2007)

中华人民共和国国家知识产权局(ISA/CN)

中国北京市海淀区蓟门桥西土城路 6 号 100088

传真号: (86-10)62019451

授权官员

郭风顺

电话号码: (86-10) 82755435

## 国际检索报告

国际申请号

PCT/CN2007/002449

**第II栏 关于某些权利要求不能作为检索主题的意见(接第1页第2项)**

按条约 17(2)(a)对某些权利要求未作国际检索报告的理由如下:

1. ☐ 权利要求:

因为它们涉及到不要求本国际检索单位进行检索的主题,即:

2. ☐ 权利要求:因为它们涉及到国际申请中不符合规定的要求的部分,以致不能进行任何有意义的国际检索,  
具体地说:3. ☐ 权利要求:

因为它们是从属权利要求,并且没有按照细则 6.4(a)第2句和第3句的要求撰写。

**第III栏 关于缺乏发明单一性时的意见(接第1页第3项)**

本国际检索单位在该国际申请中发现多项发明,即:

本国际单位认为:权利要求书包括有两项发明,即:(1)权利要求 1-10 和(2)权利要求 11-14。权利要求 1-10 涉及接入设备利用接入响应消息中的路由相关信息来管理路由信息;(2)权利要求 11-14 涉及利用接入设备进行数据的转发。上述两组权利要求仅具有相同或相应的技术特征“接入设备”,但它们利用接入设备完成的是完全不同的功能。因此,上述两组权利要求不具有相同或相应的体现发明对现有技术作出贡献的特定技术特征,不存在技术关联,不属于一个总的发明构思,因此,不满足发明单一性的要求,不符合 PCT 细则 13.1 的规定。由于权利要求 15,16 分别包括有权利要求 6-10 中任一项的路由管理装置和/或权利要求 13 或 14 中的转发装置,因此,权利要求 15,16 分别与权利要求 1-10 和权利要求 11-14 均具有单一性。

1. ☐ 由于申请人按时缴纳了被要求缴纳的全部附加检索费,本国际检索报告针对全部可作检索的权利要求。2. ☒ 由于无需付出有理由要求附加费的劳动即能对全部可检索的权利要求进行检索,本国际检索单位未通知缴纳任何附加费。3. ☐ 由于申请人仅按时缴纳了部分被要求缴纳的附加检索费,本国际检索报告仅涉及已缴费的那些权利要求。  
具体地说,是权利要求:4. ☐ 申请人未按时缴纳被要求的附加检索费。因此,本国际检索报告仅涉及权利要求中首次提及的发明;  
包含该发明的权利要求是:关于异议的说明: ☐ 申请人缴纳了附加检索费,同时提交了异议书,缴纳了异议费。☐ 申请人缴纳了附加检索费,同时提交了异议书,但未缴纳异议费。☐ 缴纳附加检索费时未提交异议书。

国际检索报告

国际申请号

PCT/CN2007/002449

续：在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用））

WPI;EPODOC;PAJ;CNKI;IEEE;CPRS……和关键词：

殷芹, 缪应忠, 朱建华, 姚亦峰, 阿尔卡特, 路由, 响应, 更新, 创建, 生成, 用户线路接入复用器, DSLAM, DHCP, 时间, 子网, 网关, 转发, 接入, 表

rout???, respons???, updat???, generat???, DSLAM, DHCP, tim???, subnet, gateway, retransmit????, access???, table, list

国际检索报告  
关于同族专利的信息

国际申请号  
PCT/CN2007/002449

检索报告中引用的 专利文件	公布日期	同族专利	公布日期
US 2002138614 A1	26.09.2002	无	
JP2002-217941 A	02.08.2002	无	
KR 20040011936 A	11.02.2004	US 2005184780 A1	25.08.2005
		US 7142028 B	28.11.2006
		KR20050083423 A	26.08.2005
		CN 1661918 A	31.08.2005
		TW260859B B	21.08.2006
		KR 20040011936 A	11.02.2004
US 2006140164 A1	29.06.2006	无	

VIII-3-1	声明：有权要求优先权 关于申请人在国际申请日有权要求下面指明的在先申请优先权的声明，如果该申请人不是在先申请的申请人或在提交在先申请后，申请人的姓名进行了变更(4.17(iii)和51之二.1(a)(iii))： 姓名	关于 本国际申请  阿尔卡特朗讯 (ALCATEL LUCENT) 基于下列事项，有权要求申请号为 200610030926.0 的在先申请的优先权：
VIII-3-1(iv)		上海贝尔阿尔卡特股份有限公司 (ALCATEL SHANGHAI BELL COMPANY, LTD.) 于 2007年 8月 13日 (13.08.2007) 向 阿尔卡特朗讯 (ALCATEL LUCENT) 进行的转让
VIII-3-1(ix)	本声明是对：	所有指定国

**第VIII(iv)栏 声明：发明人资格声明（仅为了指定美国的目的）**

声明必须与规程 214 条的标准语句一致；参见对于 VIII、VIII(i)到(v) (概述)的说明和专门对于 VIII(iv)的说明。如果不使用本栏，则请求书中不应包括此页。

**发明人资格声明 (细则 4.17(iv)和 51 之二.1(a)(iv))  
为了指定美国的目的：**

我在此声明我相信我是要求保护和寻求专利的主题的原始、最初和唯一的（如果只列出了一个发明人）或者共同的（如果列出了不只一个发明人）发明人。

本声明是本国际申请的一个组成部分（如果本声明与国际申请一起提出）。

本声明是关于 PCT/CN2007/002409 号国际申请的（如果本声明根据细则 26 之三提出）。

我在此声明我的居所，邮寄地址和国籍和列在我名字下面的一样。

我在此声明我已检查过并理解上述国际申请的内容，包括所述申请的权利要求书。在所述申请的请求书中，我按照 PCT 细则 4.10 写明了对外国优先权的任何要求，并且在下面的“在先申请”栏目下，通过申请号，国家或世界贸易组织成员，申请的日、月、年，我写明了向美国以外的国家提出的，其申请日早于所要求的外国优先权申请的申请日的任何专利申请或者发明人证书申请，包括指定至少一个除美国以外的国家的任何 PCT 国际申请。

在先申请：200610030926.0 07 09 月 2006 中国 CN

我在此承认自己有义务公开我知道的，根据美国联邦法规（CFR）第 37 篇第 1.56 条对确定专利性有实质意义的信息，包括对于部分继续申请，在该在先申请的申请日和该部分继续申请的 PCT 国际申请日之间可得到的实质性信息。

我在此声明所有根据我自己的知识所作的声明是真实的，并且所有根据信息和相信所作的声明相信是真实的；而且在作这些声明时我知道根据美国法典第 18 篇第 1001 条故意作假声明以及有关类似行为将受到罚款或监禁或二者并罚的惩罚，并且这样的故意假声明将危害申请或根据该申请授予的任何专利的有效性。

姓名：殷芹 YIN, Qin

居所(城市 and 美国的州(适用时)，或国家)：中国 CHINA

邮寄地址：中国上海市浦东金桥宁桥路 388 号 邮编 201206  
388, NINGQIAO ROAD, PUDONG JINQIAO, SHANGHAI 201206, PR. CHINA

国籍：中国 CN

发明人的签字：殷芹 日期：2007-7-20

(该签字必须是发明人的签字，而不是代理人的签字)

姓名：缪应忠 MIU, Yingzhong

居所(城市 and 美国的州(适用时)，或国家)：中国 CHINA

邮寄地址：中国上海市浦东金桥宁桥路 388 号 邮编 201206  
388, NINGQIAO ROAD, PUDONG JINQIAO, SHANGHAI 201206, PR. CHINA

国籍：中国 CN

发明人的签字：缪应忠 日期：2007.7.20

(该签字必须是发明人的签字，而不是代理人的签字)

☐ 本声明下转声明续页中“续第 VIII (iv) 栏”。



## 续第VIII(i)至(v)栏 声明

如果在任何从第 VIII(i) 到 (v) 的栏中, 没有足够页面填写所有的内容, 包括第 VIII(iv) 栏中, 有多个发明人需指明时, 应填写续第 VIII 栏 (指明栏号), 并且应按照其所在栏目的要求填写没有写下的内容。如果有两个或两个以上声明需附加页时, 每份声明都应使用单独的续栏。如果不使用本栏, 则请求书中不应包括此页。

## 续第VIII (iv) 栏

姓名: 朱建华 ZHU, Jianhua居所(城市 and 美国的州(适用时), 或国家): 中国 CHINA邮寄地址: 中国上海市浦东金桥宁桥路 388 号 邮编 201206  
388, NINGQIAO ROAD, PUDONG JINGQIAO, SHANGHAI 201206, PR. CHINA国籍: 中国 CN发明人的签字: 日期: 2007.7.20

(该签字必须是发明人的签字, 而不是代理人的签字)

姓名: 姚亦峰 YAO, Yifeng居所(城市 and 美国的州(适用时), 或国家): 中国 CHINA邮寄地址: 中国上海市浦东金桥宁桥路 388 号 邮编 201206  
388, NINGQIAO ROAD, PUDONG JINGQIAO, SHANGHAI 201206, PR. CHINA国籍: 中国 CN发明人的签字: 日期: 2007.7.25

(该签字必须是发明人的签字, 而不是代理人的签字)

VIII-3-1	声明：有权要求优先权 关于申请人在国际申请日有权要求下面指明的在先申请优先权的声明，如果该申请人不是在先申请的申请人或在提交在先申请后，申请人的姓名进行了变更(4.17(iii)和51之二.1(a)(iii))： 姓名	关于 本国际申请  阿尔卡特朗讯 (ALCATEL LUCENT) 基于下列事项，有权要求申请号为 200610030926.0 的在先申请的优先权：
VIII-3-1(iv)		上海贝尔阿尔卡特股份有限公司 (ALCATEL SHANGHAI BELL COMPANY, LTD.) 于 2007年 8月 13日 (13.08.2007) 向 阿尔卡特朗讯 (ALCATEL LUCENT) 进行的转让
VIII-3-1(ix)	本声明是对：	所有指定国

VIII-3-1	声明：有权要求优先权 关于申请人在国际申请日有权要求下面指明的在先申请优先权的声明，如果该申请人不是在先申请的申请人或在提交在先申请后，申请人的姓名进行了变更(4.17(iii)和51之二.1(a)(iii))： 姓名	关于 本国际申请  阿尔卡特朗讯 (ALCATEL LUCENT) 基于下列事项，有权要求申请号为 200610030926.0 的在先申请的优先权：
VIII-3-1(iv)		上海贝尔阿尔卡特股份有限公司 (ALCATEL SHANGHAI BELL COMPANY, LTD.) 于 2007年 8月 13日 (13.08.2007) 向 阿尔卡特朗讯 (ALCATEL LUCENT) 进行的转让
VIII-3-1(ix)	本声明是对：	所有指定国

**PATENT APPLICATION FEE DETERMINATION RECORD**

Effective December 8, 2004

Application or Docket Number

12310660

**CLAIMS AS FILED - PART I**

(Column 1)

(Column 2)

U.S. NATIONAL STAGE FEES		
BASIC FEE	SMALL ENT. = \$ 150	LARGE ENT. = \$ 300
EXAMINATION FEE	Satisfies PCT Article 33(1)-(4) = \$ 50 / \$ 100	All other situations = \$ 100 / \$ 200
SEARCH FEE	U.S. is ISA = \$ 50 / \$ 100 ALL other countries = \$ 200 / \$ 400	ALL other situations = \$ 250 / \$ 500
FEE FOR EXTRA SPEC. PGS.	minus 100 =	/ 50 =
TOTAL CHARGEABLE CLAIMS	minus 20 = *	
INDEPENDENT CLAIMS	minus 3 = *	
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

SMALL ENTITY TYPE ☐

OR

OTHER THAN SMALL ENTITY

RATE	FEE		RATE	FEE
BASIC FEE		OR	BASIC FEE	
EXAM. FEE			EXAM. FEE	
SEARCH FEE			SEARCH FEE	
X \$ 125 =			X \$ 250 =	
X \$ 25 =		OR	X \$ 50 =	
X \$ 100 =		OR	X \$ 200 =	
+ \$ 180 =		OR	+ \$ 360 =	
TOTAL		OR	TOTAL	

\* If the difference in column 1 is less than zero, enter "0" in column 2

**CLAIMS AS AMENDED - PART II**

(Column 1)

(Column 2)

(Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* 17	Minus	**	=
	Independent	* 4	Minus	*** 1	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X \$ 25 =		OR	X \$ 50 =	
X \$ 100 =		OR	X \$ 200 =	
+ \$ 180 =		OR	+ \$ 360 =	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X \$ 25 =		OR	X \$ 50 =	
X \$ 100 =		OR	X \$ 200 =	
+ \$ 180 =		OR	+ \$ 360 =	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than '20', enter "20".

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than '3', enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET (FOR USE WITH FORM PTO-875)							SERIAL NO. <b>12310660</b>	FILING DATE					
							APPLICANT(S)						
CLAIMS													
	AS FILED		AFTER 1 <sup>st</sup> AMENDMENT		AFTER 2 <sup>nd</sup> AMENDMENT			AS FILED		AFTER 1 <sup>st</sup> AMENDMENT		AFTER 2 <sup>nd</sup> AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.		IND.	DEP.	IND.	DEP.	IND.	DEP.
1	/		/				51						
2		/	/	/			52						
3		/	/	/			53						
4		/	/	/			54						
5		3	/	/			55						
6	/		/	/			56						
7		/	/	/			57						
8		2	/	/			58						
9		2	/	/			59						
10		1	/	/			60						
11	/		/	/			61						
12		/	/	/			62						
13	/		/	/			63						
14		/	/	/			64						
15		1	/	/			65						
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44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
TOTAL IND.		↓	4	↓		↓	TOTAL IND.		↓		↓		↓
TOTAL DEP.		←	13	←		←	TOTAL DEP.		←		←		←
TOTAL CLAIMS			17				TOTAL CLAIMS						

## DO/EO WORKSHEET

Fred Smith, Patent Application Specialist/ National Stage Division

U.S. Appl. No. 12310660International Appl. No. PCT/CN2007/02244/9Application filed by: ☐ 20 months ☒ 30 months

## WIPO PUBLICATION INFORMATION:

Publication No.: WO2008/031319

Publication Language: ☐ English ☐ German ☐ Japanese ☐ Chinese ☐ Korean  
☐ French ☐ Spanish ☐ Russian ☐ Other: \_\_\_\_\_Publication Date: June 2008Not Published: ☐ U.S. only designated ☐ EP requestPublished: ☒ EP request

## INTERNATIONAL APPLICATION PAPERS IN THE APPLICATION FILE:

☒ International Application (RECORD COPY)☐ PCT/IB/306☐ Article 19 Amendments☐ Request form PCT/RO/101☐ PCT/IPEA/409 IPER: ☐ EP ☐ JP ☐ SE ☐ AU  
☐ US ☐ FR ☐ CN ☐ ES ☐ RU ☐ AT ☐ KR ☐ \_\_\_\_\_☒ PCT/ISA/210 - Search Report: ☐ EP ☐ JP ☐ SE ☐ AU  
☐ US ☐ FR ☒ CN ☐ ES ☐ RU ☐ AT ☐ KR ☐ \_\_\_\_\_ ☐ NONE☐ Annexes to 409☐ Search Report References☐ PCT/ISA/237: ☐ EP ☐ JP ☐ SE ☐ AU☐ Priority Document (s) No. \_\_\_\_\_☐ US ☐ FR ☐ CN ☐ ES ☐ RU ☐ AT ☐ KR ☐ \_\_\_\_\_☐ N/A☐ PCT/IPEA/409 or PCT/ISA/237 was NOT AVAILABLE at the time of paralegal review☐ Priority Document was NOT AVAILABLE at the time of paralegal review☐ Other: \_\_\_\_\_

## RECEIPTS FROM THE APPLICANT (other than checked above):

☐ Basic National Fee (or authorization to charge)☒ Preliminary Amendment(s) Filed on:1. ☒ same as 371 request date 2. \_\_\_\_\_ 3. \_\_\_\_\_☐ Description ☐ Claims ☐ Abstract☒ Information Disclosure Statement(s) Filed on:1. ☒ same as 371 request date 2. \_\_\_\_\_ 3. \_\_\_\_\_☒ Drawing Figure(s) - (# of drwgs. 6)☐ Assignment Document (forwarded to Assignment Branch)☐ Translation of Article 19 Amendments☐ Assignee Statement Under 37 CFR 3.73(b)☐ entered ☐ not entered:☐ Assignee PG Publication Notice☐ not a page for page substitution☐ replaced by Article 34 Amendment☐ Substitute Specification Filed on:1. ☐ same as 371 request date 2. \_\_\_\_\_ 3. \_\_\_\_\_☐ Annexes to 409☐ Verified Small Status Statement ☐ I☐ entered ☐ not entered:☐ not a page for page substitution☐ no translation ☐ other: \_\_\_\_\_☒ Oath/ Declaration (executed)☐ Application Data Sheet☐ Oath/ Declaration ☐ unsigned ☐ no citizenship ☐ other☐ Power of Attorney☐ DNA Diskette ☐ Sequence Listing☐ Change of Address☐ Other: \_\_\_\_\_NOTES: ☐ I.A. used as Specification ☐ Other:

35 U.S.C. 371 - Receipt of Request (PTO-1390)

mo. 3 / day 3 / yr. 2009

Date Acceptable Oath/ Declaration Received

☐ Same as 371 Req. Date; ☐ mo. 5 / day 29 / yr. 2009

Date of Completion of requirements under 35 U.S.C. 371

☐ Same as 371 Req. Date; ☐ Same as OATH Date; ☐ mo. / day / yr. 200

Date of Completion of DO/ EO 903 - Notification of Acceptance

Date of Completion of DO/ EO 905 - Notification of Missing Requirements

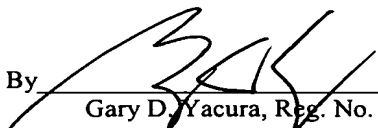
Date of Completion of DO/ EO 909 - Notification of Abandonment

Date of Completion of DO/ EO 916 - Notification of Defective Response

Date of Completion of DO/ EO 922 - Notification to Comply w/ Requirements for Patent Applications  
Containing Nucleotide and/or Amino Acid Sequence Disclosures

Date of Completion of DO/ EO 923

FORM PTO-1390 OFFICE (Modified)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK		ATTORNEY'S DOCKET NUMBER 29250H-000013/US	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5) <b>12/310,660</b>	
				U.S. Filing Date: March 3, 2009	
INTERNATIONAL APPLICATION NO. <b>PCT/CN2007/002449</b>		INTERNATIONAL FILING DATE <b>August 14, 2007</b>		PRIORITY DATE CLAIMED <b>September 7, 2006</b>	
TITLE OF INVENTION METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES					
APPLICANT(S) FOR DO/EO/US Qin YIN, Yingzhong MIU, Jianhua ZHU and Yifeng YAO					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input checked="" type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).</p> <p>4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> has been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input type="checkbox"/> is transmitted herewith.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4)</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> have been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>					
Items 11. to 20. below concern document(s) or information included:					
<p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98-1449, International Search Report (PCT/ISA/210 and PCT/ISA/220) in English and PTO Form 1449 with</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input type="checkbox"/> Other items or information:</p>					

U.S. APPLICATION NO (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO		ATTORNEY'S DOCKET NUMBER													
12/310,660		PCT/CN2007/002449		29250H-000013/US													
21. <input checked="" type="checkbox"/> The following fees are submitted:  <b>PCT FEES – NATIONAL STAGE:</b>  <table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Fee Code</th> <th style="text-align: left;">Description</th> <th style="text-align: left;">Fee</th> </tr> <tr> <td>1631</td> <td>Basic National Stage Fee.....</td> <td>\$330.00</td> </tr> <tr> <td>1632</td> <td>National Stage Search Fee.....</td> <td>\$530.00</td> </tr> <tr> <td>1633</td> <td>National Stage Examination Fee.....</td> <td>\$230.00</td> </tr> </table>				Fee Code	Description	Fee	1631	Basic National Stage Fee.....	\$330.00	1632	National Stage Search Fee.....	\$530.00	1633	National Stage Examination Fee.....	\$230.00	<b>CALCULATIONS      PTO USE ONLY</b>	
				Fee Code	Description	Fee											
1631	Basic National Stage Fee.....	\$330.00															
1632	National Stage Search Fee.....	\$530.00															
1633	National Stage Examination Fee.....	\$230.00															
<b>ENTER APPROPRIATE FEE AMOUNT =</b>  Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 Months from the earliest claimed priority date (37 CFR 1.492(e)).				\$													
				\$	<b>PAID ON March 3, 2009</b>												
PAGES	PAGES FILED	EXTRA PAGES FILED IN 50 PAGE SEGMENTS	RATE														
Total Pages	- 100 =		X 250.00	\$													
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE														
Total Claims	- 20 =		X \$50.00	\$													
Independent Claims	- 3 =		X \$200.00	\$													
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$360.00	\$													
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$													
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$													
<b>SUBTOTAL =</b>				\$													
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 Months from the earliest claimed priority date (37 CFR 1.492(f)).				\$													
<b>TOTAL NATIONAL FEE =</b>				\$													
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property +				\$													
<b>TOTAL FEES ENCLOSED =</b>				\$	0.00												
				Amount to be: refunded	\$												
				charged	\$												
a. <input type="checkbox"/> A check in the amount of \$_____ to cover the above fees is enclosed.  b. <input type="checkbox"/> Please charge my Deposit Account. No. 08-0750 in the amount of \$_____ to cover the above fees. A triplicate copy of this sheet is enclosed.  c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>08-0750</u> .																	
<b>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b>																	
Send all correspondence to: <b>Harness, Dickey &amp; Pierce, P.L.C – Customer No. 30593</b> <b>Post Office Box 8910</b> <b>Reston, Virginia 20195</b>																	
<b>Date: May 29, 2009</b>			By  Gary D. Yacura, Reg. No. 35,416														
GDY/ame																	



**DECLARATION AND POWER OF ATTORNEY**

-----Atty. Docket No.: 29250-00 /US-----

**DECLARATION**

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS DEVICES**

the specification of which (check one)

- ☐ is attached hereto.  
or  
☒ was filed on August 14, 2007 as Application Serial No. or PCT International Application No. PCT/CN2007/002449 and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. §§ 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)				
APPN. SERIAL NO.	COUNTRY	DATE FILED (MM/DD/YYYY)	PRIORITY CLAIM	
			Yes	No
200610030926.0	CN	09/07/2006	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>

**DECLARATION AND POWER OF ATTORNEY**

Atty. Docket. No.: 29250-00 /US

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

PRIOR PROVISIONAL APPLICATION(S)	
APPN. SERIAL NO.	DATE FILED (MM/DD/YYYY)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) listed below:

PRIOR U.S. APPLICATION(S)		
APPN. SERIAL NO.	DATE FILED (MM/DD/YYYY)	STATUS - PATENTED, PENDING, ABANDONED

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**POWER OF ATTORNEY**

I hereby appoint the following attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

John A. Castellano	Reg. No. 35,094
Terry L. Clark	Reg. No. 32,644
Donald J. Daley	Reg. No. 34,313
Gary D. Yacura	Reg. No. 35,416

and all individuals assigned to Customer No. **30594**.

## DECLARATION AND POWER OF ATTORNEY

Atty. Docket. No.: 29250-00 /US

### CORRESPONDENCE ADDRESS

I request the Patent and Trademark Office to direct all correspondence and telephone calls relative to this application to Harness, Dickey & Pierce, P.L.C., Customer No. **30594**, P.O. Box 8910, Reston, Virginia, 20195, (703) 668-8000.

#### Full name of sole or first inventor:

Inventor's signature: Yin Qin 殷芹

Date: 2009-2-26

Residence: China

Citizenship: China

Mailing Address: ALCATEL SHANGHAI BELL 388 Ningqiao Road PuDong Jinqiao  
201206 SHANGHAI CHINA, China

#### Full name of second joint inventor:

Inventor's signature: Miao Yingzhong 苗应忠

Date: 2009.2.26

Residence: China

Citizenship: China

Mailing Address: ALCATEL SHANGHAI BELL 388 Ningqiao Road PuDong Jinqiao  
201206 SHANGHAI CHINA, China

#### Full name of third joint inventor:

Inventor's signature: Zhu Jianhua 朱建华

Date: 2009.2.26

Residence: China

Citizenship: China

Mailing Address: ALCATEL SHANGHAI BELL 388 Ningqiao Road PuDong Jinqiao  
201206 SHANGHAI CHINA, China

## DECLARATION AND POWER OF ATTORNEY

Atty. Docket. No.: 29250-00 /US

**Full name of fourth joint inventor:**

Inventor's signature: Yao yibeng 姚一冰

Date: 2009-2-26

Residence: China

Citizenship: China

Mailing Address: ALCATEL SHANGHAI BELL 388 Ningqiao Road PuDong Jinqiao  
201206 SHANGHAI CHINA, China



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
12/310,660	05/29/2009	2419	1330	29250H-000013/US	17	4

CONFIRMATION NO. 2600

30594

HARNESS, DICKEY &amp; PIERCE, P.L.C.

P.O. BOX 8910

RESTON, VA 20195

## FILING RECEIPT



\*OC000000037886775\*

Date Mailed: 09/23/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Applicant(s)**

Qin Yin, Shanghai, CHINA;  
 Yingzhong Miu, Shanghai, CHINA;  
 Jianhua Zhu, Shanghai, CHINA;  
 Yifeng Yao, Shanghai, CHINA;

**Power of Attorney:** The patent practitioners associated with Customer Number 30594

**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/CN2007/002449 08/14/2007

**Foreign Applications**

CHINA 200610030926.0 09/07/2006

**If Required, Foreign Filing License Granted:** 09/18/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/310,660**

**Projected Publication Date:** 12/31/2009

**Non-Publication Request:** No

**Early Publication Request:** No

**Title**

Method and apparatus for managing route information and forwarding data in access devices

**Preliminary Class**

370

## **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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### **LICENSE FOR FOREIGN FILING UNDER**

#### **Title 35, United States Code, Section 184**

#### **Title 37, Code of Federal Regulations, 5.11 & 5.15**

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U.S. APPLICATION NUMBER NO. 12/310,660	FIRST NAMED APPLICANT Qin Yin	ATTY. DOCKET NO. 29250H-000013/US		
30594 HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195		INTERNATIONAL APPLICATION NO. PCT/CN2007/002449		
		<table border="1"> <tr> <td>I.A. FILING DATE 08/14/2007</td> <td>PRIORITY DATE 09/07/2006</td> </tr> </table>	I.A. FILING DATE 08/14/2007	PRIORITY DATE 09/07/2006
I.A. FILING DATE 08/14/2007	PRIORITY DATE 09/07/2006			

**CONFIRMATION NO. 2600**  
**371 ACCEPTANCE LETTER**



\*OC000000037886776\*

Date Mailed: 09/23/2009

**NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495**

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

05/29/2009  
 DATE OF RECEIPT OF 35 U.S.C. 371(c)(1),  
 (c)(2) and (c)(4) REQUIREMENTS

05/29/2009  
 DATE OF COMPLETION OF ALL  
 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 03/03/2009
- English Translation of the IA filed on 03/03/2009
- Copy of the International Search Report filed on 03/03/2009
- Preliminary Amendments filed on 03/03/2009
- Information Disclosure Statements filed on 03/03/2009
- Oath or Declaration filed on 05/29/2009
- Request for Immediate Examination filed on 03/03/2009
- U.S. Basic National Fees filed on 03/03/2009
- Non-English Language Application filed on 03/03/2009



Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

FREDERICK SMITH

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Telephone: (703) 756-1455



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/310,660	05/29/2009	Qin Yin	29250H-000013/US

CONFIRMATION NO. 2600

## PUBLICATION NOTICE



\*OC000000039429829\*

30594  
 HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

**Title:**Method and apparatus for managing route information and forwarding data in access devices

**Publication No.**US-2009-0323693-A1

**Publication Date:**12/31/2009

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

30594 7590 10/26/2010  
 HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

EXAMINER
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DUONG, FRANK

ART UNIT	PAPER NUMBER
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2474

MAIL DATE	DELIVERY MODE
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10/26/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

12/310,660

**Applicant(s)**

YIN ET AL.

**Examiner**

Frank Duong

**Art Unit**

2474

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-7 and 9-17 is/are rejected.
- 7) ☒ Claim(s) 3 and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 May 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 2

### **DETAILED ACTION**

1. This Office Action is a response to communications dated 05/29/09. Claims 1-17 are pending in the application.

### ***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

3. The information disclosure statement filed 03/03/09 complies with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609. It has been considered and placed in the application file.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 3

As per claim 13, the claim is rejected under 35 U.S.C 112, first paragraph, as based on a single means claim, i.e. an apparatus, where a means recitation does not appear in combination with another recited element of means. A single means claim which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor. It has been held in *Hyatt* that when claims depend on a recited property, where the claim covers every conceivable structure (means) for achieving the stated property (result) while the specification discloses at most only those known to the inventor. In *re Hyatt*, 708 F.2d 712, 714-715, 218 USPQ 195, 197(Fed. Cir. 1983).

In the present case, although claim 13 does not recite even a single means, it is an analogous to single means claim in that it recites neither a specific structure nor a combination of means. In the absence of any recitation of structure or multiple means, the claim is not drawn to a combination. Thus, the claim appears to cover "every conceivable means" for achieving the stated purpose, whereas the specification discloses only those limited means or elements known to the inventor.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-14 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 4

As per base claim 11, the claim appears to draw to a process/method. However, the claim is narrative in form and does not contain positively recited steps of a specific process. Note that method claims should set forth a series of steps in the active tense in an instruction-like manner thereby reciting an actual method. Dependent claims should further limit base claims by reciting additional steps in a like-wise fashion. See *Ex parte Erlich 3 USPQ 2d 1011 at 1017[6]*. Moreover, the “wherein” clause recited in the claim appears to be vague. It is unclear what subject previously recited in the claim the “wherein” clause modifies.

As per dependent claim 12, it variously depends from its indefinite parent claim 11.

As per base claim 13, the claim appears to draw to an apparatus or a device. However, it fails to set forth a series of elements/limitations structurally and functionally interconnected with each other of an apparatus/a device, delineating by the words comprising of, comprising, consisting off ... etc. Lacking such structure, the claim is deemed indefinite because it fails to set forth the metes and bounds of a claimed invention that the inventors seek to protect. Moreover, the “wherein” clause recited in the claim appears to be vague. It is unclear what subject previously recited in the claim the “wherein” clause modifies.

As per dependent claims 14 and 17, they variously depend from their indefinite parent claim 13.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 5

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-2, 4-7, and 9-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Kolli et al (PGPUB 2008/0212598) (hereinafter “Kolli”).

Regarding **claim 1**, in accordance with Kolli reference entirety, Kolli teaches a method, in an access device (*Fig. 4; 426&410 and description starting at para [0047] and thereafter or Fig. 11a; 1120*) of the communication network (1100), for managing route information (*para [0073]-[0075]*), comprising:

a. receiving an access response message (1176) which is from a server (1170) and sent to a user terminal (1132 or 1130) (*para [0075], it is discussed the DHCP server 1170 sends a DHCP reply 1176 back to the transparent virtual router 1120 and requesting host 1120 or CPE 1130*);

b. obtaining route-related information from said access response message (1176) (*para [0075], it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration*);



Application/Control Number: 12/310,660  
Art Unit: 2474

Page 6

c. based on said route-related information, creating or updating a route table item (para [0075], it is further discussed the transparent virtual router 1120 then configures this information into the routing table or an entry is added to the route table).

Regarding **claim 2**, in addition to features recited in base claim 1 (see rationales discussed above), Kolli also discloses wherein said step b further comprises: obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route (para [0075], it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration); wherein said step c further comprises: based on said predefined using time, updating said route table item (para [0075], lease time is inspected or snooped by the transparent virtual router 1120 and it is configured to the route table by the transparent virtual router 1120).

Regarding **claim 4**, in addition to features recited in base claim 1 (see rationales discussed above), Kolli also discloses obtaining correlated information of said route table item and a virtual local area network (VLAN) from an address resolution protocol (ARP) message (IP Subnets corresponding to VLAN is discussed at para [0060], and ARP is discussed at para [0080] and thereafter) or an access response message (DHCP reply 1176) (para [0075], it is disclosed the transparent virtual router 1120 inspects or snoops the DHCP reply 1176 to ascertain which IP address has been assigned and the duration of such assignment. It then configures this information into the routing table for the application TVR group); wherein said virtual local area network (VLAN) configuration is employed between said access device (Fig. 4; CPE 412) and

Application/Control Number: 12/310,660

Page 7

Art Unit: 2474

each marginal router (*Fig. 4; 460 or 452*) connected with said access device (*Fig. 4; CPE 412*) (*see Fig. 4 for connection details*).

Regarding **claim 5**, in addition to features recited in base claim 1 (see rationales discussed above), Kolli also discloses wherein said access response message refers to a dynamic host configuration protocol response message (*DHCP reply 1176*), said predefined using time refers to the lease time in said dynamic host configuration protocol response message (*para [0075], DHCP reply 1176 and lease time are discussed*).

*(Note: Claims 6-7, 9-10 and 15-16 call for an apparatus having limitations mirrored method steps of method claims 1-2 and 4-5. Thus, they are anticipated by Kolli for the same rationales applied to claims 1-2 and 4-5 as discussed above and below)*

Regarding **claims 6 and 15-16**, in accordance with Kolli reference entirety, Kolli shows a route management apparatus (*Fig. 4; 426&410 and description starting at para [0047] and thereafter or Fig. 11a; 1120*), in an access device of the communication network having therein a DSLAM (*para [0047]*), for managing route information, comprising:

a receiving means, configured to receive an access response message (1176) which is from a server (1120) and sent to a terminal (1132 or 1130) (*para [0075], it is discussed the DHCP server 1170 sends a DHCP reply 1176 back to the transparent virtual router 1120 and requesting host 1120 or CPE 1130*);

a first obtaining means, configured to obtain said route-related information from said access response message (1176) (*para [0075], it is also discussed the transparent*

Application/Control Number: 12/310,660

Page 8

Art Unit: 2474

*virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration);*

a route maintenance means, configured to create or update a route table based on said route-related information (*para [0075], it is further discussed the transparent virtual router 1120 then configures this information into the routing table or an entry is added to the route table*).

Regarding **claim 7**, in addition to features recited in base claim 6 (see rationales discussed above), Kolli also discloses wherein said obtaining means is further configured to obtain a predefined using time from said access response message, said predefined using time is used to indicate the using time of said router; wherein, said route maintenance means updates said route table item further based on said predefined using time (*para [0075], it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration*); wherein said step c further comprises: based on said predefined using time, updating said route table item (*para [0075], lease time is inspected or snooped by the transparent virtual router 1120 and it is configured to the route table by the transparent virtual router 1120*).

Regarding **claim 9**, in addition to features recited in base claim 6 (see rationales discussed above), Kolli also discloses a second obtaining means, configured to obtain correlated information of said route table item and a virtual local area network (*para [0075], it is further discussed the transparent virtual router 1120 then configures this information into the routing table or an entry is added to the route table. In addition, IP*

Application/Control Number: 12/310,660

Page 9

Art Unit: 2474

*Subnets corresponding to VLAN is discussed at para [0060]); wherein said virtual local area network (VLAN) configuration is employed between said access device (Fig. 4; CPE 412) and each marginal routers (Fig. 4; 460 or 452) connected with said access device (Fig. 4; CPE 412) (see Fig. 4 for connection details)*

Regarding **claim 10**, in addition to features recited in base claim 6 (see rationales discussed above), Kolli also discloses wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol response message (*para [0075], DHCP reply 1176 and lease time are discussed thereat*).

Regarding **claim 11**, in accordance with Kolli reference entirety, Kolli teaches a method, in an access device of the communication network, for forwarding data, wherein data coming from user terminals (*Fig 4; 412 or Fig. 5; 530*) of different sub-networks (426) is forwarded to corresponding sub-network gateway (460 or 452) (*see para [0050] or para [0053] or para [0060] and thereafter*).

Regarding **claim 12**, in addition to features recited in base claim 11 (see rationales discussed above), Kolli also discloses the steps of: a. receiving a packet from a user terminal; b. obtaining the source network address of the destination network address from said packet; c. based on said source network address and destination network address, inquiring a gateway which can get to the destination network and matches the source network address from a route table, and a forwarding port corresponding to said gateway; d. sending said packet to the gateway of said corresponding sub-network via said forwarding port (*para [0053] and thereafter, it is*

Application/Control Number: 12/310,660

Page 10

Art Unit: 2474

*disclosed the transparent virtual router 510 determines host device 530 to which a packet should be sent by using the destination IP address of the packet as an index into one or more routing tables maintained by router 510).*

*(Note: Claims 13-14 and 17 call for an apparatus having limitations mirrored method steps of method claims 11-12. Thus, they are anticipated by Kolli for the same rationales applied to claims 11-12 as discussed above and below)*

Regarding **claims 13 and 17**, in accordance with Kolli reference entirety, Kolli show a forwarding apparatus, in an access device of the communication network, for forwarding data, wherein data coming from user terminals (*Fig 4; 412 or Fig. 5; 530*) of different sub-networks (426) is forwarded to corresponding sub-network gateway (460 or 452) (*see para [0050] or para [0053] or para [0060] and thereafter*).

Regarding **claim 14**, in addition to features recited in base claim 13 (*see rationales discussed above*), Kolli also shows a receiving means, configured to receive a packet from a user terminal; an obtaining means, configured to obtain the source network address and the destination network address from said packet; an inquiring means, configured to inquire a gateway which can get to the destination network and matches the source network address from a route table, and a forwarding port corresponding to said gateway; a sending means, configured to send said packet to the gateway of said corresponding sub-network via said forwarding port (*para [0053] and thereafter, it is disclosed the transparent virtual router 510 determines host device 530 to which a packet should be sent by using the destination IP address of the packet as an index into one or more routing tables maintained by router 510*).

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 11

***Allowable Subject Matter***

7. Claims 3 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, considered individually or in combination, appears to fail to fairly show or suggest a claimed invention of base claims 1 and 6, and further limits with novel and unobvious limitations of *“wherein said step of updating said route table item based on said predefined using time further comprises: judging whether a route table item corresponding to said route-related information exists in said route table; if a route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time, then updating the remaining time of said route table item to said predefined using time; if a route table item corresponding to said route-related information doesn't exist in said route table, then creating a route table item corresponding to said route-related information,”* as recited in the dependent claim 3; and *“wherein said route maintenance means comprises: a first judging means, configured to judge whether a route table item corresponding to said route-related information exists in said route table; a second judging means, configured to judge whether the remaining time of said route table item is shorter than said predefined using time when a route table item corresponding to said route-related information exists in said route table; a updating means, configured to update the remaining time of said*

Application/Control Number: 12/310,660

Page 12

Art Unit: 2474

*route table item to said predefined using time when a route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time; a creating means, configured to create a route table item corresponding to said route-related information when no route table item corresponding to said route-related information exists in said route table,” as recited in the dependent claim 8, structurally and functionally interconnected with other limitations in a manner as claimed.*

### **Conclusion**

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gai et al (USP 6,697,360).

Johnson et al (USP 7,358,973).

PowerConnect Application Note #38, What is VLAN Routing?, DELL, 5 pages, February 2004.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank Duong whose telephone number is 571-272-3164. The examiner can normally be reached on 7:00AM-3:30PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Moe S. Aung can be reached on 571-272-7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number: 12/310,660

Page 13

Art Unit: 2474

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Frank Duong/  
Primary Examiner, Art Unit 2474  
October 18, 2010



<b>Notice of References Cited</b>	Application/Control No. 12/310,660		Applicant(s)/Patent Under Reexamination YIN ET AL.	
	Examiner Frank Duong		Art Unit 2474	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2008/0212598	09-2008	Kolli et al.	370/409
*	B	US-6,697,360	02-2004	Gai et al.	370/389
*	C	US-7,385,973	06-2008	Johnson et al.	370/389
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	PowerConnect Application Note #38, What is VLAN Routing?, DELL, 5 pages, February 2004.
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  Frank Duong	<b>Art Unit</b>  2474

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47										
CLAIM		DATE								
Final	Original	10/18/2010								
	1	✓								
	2	✓								
	3	O								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	O								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								



## UNITED STATES PATENT AND TRADEMARK OFFICE

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## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA; <b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007 <b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> CHINA	<b>SHEETS DRAWINGS</b> 6	<b>TOTAL CLAIMS</b> 17	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b> Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b> 1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	4	Yin-Qin.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 13:33
L2	1	Miu-Yingzhong. in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 13:33
L3	41	Zhu-Jianhua.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 13:34
L4	1	Yao-Yifeng.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 13:34

**10/ 18/ 2010 1:35:06 PM****C:\ Documents and Settings\ FDuong\ My Documents\ EAST\ Workspaces\ Default  
EAST Workspace 1600x1200.wsp**

**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	16422	VLAN or (virtual near3 ((local adj area) or LAN))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 15:54
L2	1516	1 and (DHCP or (dynamic adj host adj configuration))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 15:54
L3	505	2 and (arp or (address adj resolution))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 15:55
L4	474	3 and ((forward\$4 or switch \$4) and (gateway or rout \$4))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 15:55
L5	466	4 and ((IP or "internet protocol" or (destination and source)) same address)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 15:56
L6	121	5 and 370/351-357,389,392,395.5-395.54,464-467.ccls.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2010/10/18 15:58

**10/18/2010 3:58:25 PM**

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Workspace 1600x1200.wsp**

Receipt date: 03/03/2009

<b>Form PTO-1449</b>  <b>INFORMATION DISCLOSURE CITATION IN AN APPLICATION</b>  (Use several sheets if necessary)			<b>ATTY DOCKET NO.</b> 29250H-00013/US  <b>APPLICANTS</b> Qin YIN et al.  <b>FILING DATE</b> March 3, 2009		<b>12/310660</b> <b>APPLICATION NO.</b> NEW  <b>CONF. NO.</b> Unknown  <b>GROUP</b> Unknown		
<b>U.S. PATENT DOCUMENTS</b>							
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE	
	US 2002/0138614	09/26/2002	HALL				
	US 2006/0140164	06/29/2006	PATEL et al.				
<b>FOREIGN PATENT DOCUMENTS</b>							
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION	
						YES	NO
	KR 10-2004-0011936	02/11/2004	Korea			Abst.	
	JP 2002-217941	08/02/2002	Japan			Abst.	
<b>OTHER DOCUMENTS</b> (Include Name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.)							
<b>EXAMINER</b>  /Frank Duong/				<b>DATE CONSIDERED</b>  10/18/2010			
<small>EXAMINER: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</small>							

GDY:www

*JTF***PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660                      Group Art Unit: 2474  
 Filing Date: May 29, 2009                      Examiner: Frank Duong  
 Applicant: Qin YIN et al.  
 Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
 INFORMATION AND FORWARDING DATA IN ACCESS  
 DEVICES  
 Attorney Docket: 29250H-000013/US

Customer Service Window  
 Randolph Building  
 401 Dulany Street  
 Alexandria, VA 22314  
**Mail Stop Amendment**

January 26, 2011

**AMENDMENT UNDER 37 C.F.R. §1.111**

Sir or Madam:

In response to the Office Action mailed October 26, 2010, the following amendments and remarks are respectfully submitted in connection with the above-identified application.

**Amendments to the Claims** begin on page 2 of this Amendment.

**Remarks** begin on page 8 of this Amendment.

	<b>Claims remaining after Amendment</b>		<b>Highest number previously paid for</b>		<b>Present extra</b>
<b>Total</b>	15	-	20	=	0
<b>Independent</b>	4	-	4	=	0

**AMENDMENTS TO THE CLAIMS**

The following is a complete, marked-up listing of revised claims with a status identifier in parenthesis, underlined text indicating insertions, and strike through and/or double-bracketed text indicating deletions.

**LISTING OF CLAIMS**

1. (Currently Amended) A method, in an access device of the communication network, for managing route information, comprising:

a. receiving an access response message ~~which is from a server and sent to a user terminal;~~

b. obtaining route-related information from said access response message; and

~~—~~ e. updating a route table item in a route table based on said route-related information, ~~creating or updating a route table item.~~

2. (Currently Amended) [[A]] The method according to claim 1, wherein said obtaining includes step b ~~further comprises:~~ obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route; and

~~wherein said step c further comprises:~~ wherein the updating is further based on said predefined using time, ~~updating said route table item.~~

3. (Currently Amended) [[A]] The method according to claim 2, further comprising: ~~wherein said step of updating said route table item based on said predefined using time further comprises:~~



~~judging determining~~ whether [[a]] the route table item corresponding to said route-related information exists in said route table;

updating a remaining time of the route table item if the determining determines that [[a]] the route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time, ~~then updating the remaining time of said route table item to said predefined using time;~~ and

creating a route table item corresponding to the route-related information if the determining determines that the route table item corresponding to said route-related information does not exist in the route table.

~~if a route table item corresponding to said route-related information doesn't exist in said route table, then creating a route table item corresponding to said route-related information.~~

4. (Currently Amended) [[A]] The method according to claim 1, further comprising steps of:

obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message; wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. (Currently Amended) [[A]]The method according to claim 1, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. (Currently Amended) A route management apparatus, in an access device of the communication network, for managing route information, comprising:

a receiver ~~receiving means~~, configured to receive an access response message ~~which is from a server and sent to a terminal~~;

a first obtainer ~~obtaining means~~, configured to obtain said route-related information from said access response message; and

a route maintainer ~~maintenance means~~, configured to ~~create or~~ update a route table based on said route-related information.

7. (Currently Amended) [[An]] The apparatus according to claim 6, wherein said ~~obtaining means~~ obtainer is further configured to obtain a predefined using time from said access response message, said predefined using time indicates ~~is used to indicate~~ the using time of said router; and

~~wherein~~, said route maintainer ~~is further configured to update maintenance means~~ ~~updates~~ said route table item further based on said predefined using time.

8. (Currently Amended) [[An]] The apparatus according to claim 6, wherein said route maintainer ~~includes: maintenance means comprises:~~

a first judger ~~judging means~~, configured to judge whether the[[a]] route table item corresponding to said route-related information exists in said route table;

a second judger ~~judging means~~, configured to judge whether ~~the~~ a remaining time of said route table item is shorter than said predefined using time ~~when a~~ if the first judger judges that the route table item corresponding to said route-related information exists in said route table;

~~a updating means~~, an updater configured to update the remaining time of said route table item to said predefined using time if the first judger judges that ~~when a the~~

route table item corresponding to said route-related information exists in said route table and the second judger judges that the remaining time of said route table item is shorter than said predefined using time;

a ~~creating means~~, creator configured to create [[a]] the route table item corresponding to said route-related information ~~when~~ if the first judger judges that no route table item corresponding to said route-related information exists in said route table.

9. (Currently Amended) [[An]] The apparatus according to claim 6, further comprising:

a second obtainer ~~obtaining means~~, configured to obtain correlated information of said route table item and a virtual local area network; wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. (Currently Amended) [[An]]The apparatus according to claim 6, wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

11. (Currently Amended) A method, in an access device of the communication network, for forwarding data, ~~wherein data coming from user terminals of different sub-networks is forwarded to corresponding sub-network gateway comprising:~~

receiving a packet from a user terminal, the packet including a source network address and a destination network address;

determining a gateway that has access to a destination network corresponding with the destination network address;

determining a forwarding port of the gateway based on comparing the destination network address to a route table; and

sending the packet to the gateway via the forwarding port.

12. (Cancelled)

13. (Currently Amended) A forwarding apparatus, in an access device of the communication network, for forwarding data, comprising: ~~wherein data coming from user terminals of different sub-networks is forwarded to gateways of corresponding sub-networks.~~

a receiver configured to receive a packet from a user terminal, the packet including a source network address and a destination network address;

a processor configured to determine a gateway that has access to a destination network corresponding with the destination network address, the processor further configured to a forwarding port of the gateway based on comparing the destination network address to a route table; and

a transmitter configured to transmit the packet to the gateway via the forwarding port.

14. (Cancelled)

15. (Original) An access device in the communication network, wherein said access device comprises a route management apparatus according to claim 6.

16. (Currently Amended) [[A]] The device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

17. (Currently Amended) [[An]] The access device in the communication network, wherein said access device comprises [[a]] the forwarding apparatus according to claim 13.

**REMARKS**

Favorable reconsideration of this application, in light of the preceding amendments and following remarks, is respectfully requested.

Claims 1-11, 13 and 15-17 are pending in this application.

**Allowable Subject Matter**

Applicants note with appreciation that the Examiner has deemed claims 3 and 8 as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Rejections under 35 U.S.C. § 112**

Claims 11, 13 and 17 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection for the reasons detailed below.

To expedite prosecution and without conceding to the Examiner's positions, Applicants have amended claims 11, 13 and 17. The amended claims particularly point out and distinctly claim the subject matter of the invention.

Applicants, therefore, respectfully request that the rejection to the above claims under 35 U.S.C. § 112 be withdrawn.

**Rejections under 35 U.S.C. § 102**

Claims 1-2, 4-7 and 9-17 are rejected under 35 U.S.C. § 102(e) as being anticipated by Kolli et al. (US Publication No. 2008/0212598). Applicants respectfully traverse this rejection for the reasons detailed below.

To expedite prosecution and without conceding to the Examiner's positions, Applicants have amended claim 1 to recite, inter alia, "updating a route table item in a route table based on said route-related information." At least these limitations are not met by Kolli.

Kolli discloses a system where a DHCP server sends a DHCP reply message to a transparent virtual router. The transparent virtual router in Kolli then inspects the DHCP reply message to ascertain which IP address has been assigned and the lease duration of such assignment. The transparent virtual router in Kolli then configures the IP assignment and lease duration into a routing table.

Therefore, the system in Kolli **only discloses creating new route table items**, and is silent in regards to "**updating a route table item**" as recited in amended claim 1.

Accordingly, Applicants submit that each and every limitation as recited in amended claim 1 is not met by the cited art, and claim 1 is allowable. Applicants further submit that independent claim 6 is allowable at least for similar reasons as independent claim 1, and on its own merits.

To expedite prosecution and without conceding to the Examiner's positions, Applicants have amended claim 11 to recite, inter alia, "sending the packet **to the gateway** via the forwarding port." At least these limitations are not met by the cited art.

On page 9 of the October 26, 2010 Office Action, the Examiner alleges that paragraph [0053] of Kolli discloses "sending said packet **to the gateway** of said

corresponding sub-network via said forwarding port” as previously recited in dependent claim 12. However, paragraph [0053] of Kolli discloses determining which **user terminal** a packet should be sent to by using a virtual routing table maintained in the router.

Accordingly, paragraph [0053] of Kolli discloses a method to transmit a data packet **to a user terminal**, and cannot meet “sending the packet **to the gateway** via the forwarding port” as recited in amended claim 11.

Thus, Applicants submit that each and every limitation as recited in amended claim 11 is not met by the cited art, and claim 11 is allowable. Applicants further submit that amended independent claim 13 is allowable at least for similar reasons as amended independent claim 11, and on its own merits.

Additionally, Applicants submit that the dependent claims are allowable at least by virtue of their dependency from an allowable base claim.

Applicants, therefore, respectfully request that the rejection to the above claims under 35 U.S.C. § 102(e) be withdrawn.



**CONCLUSION**

In view of the above remarks and amendments, the Applicants respectfully submit that each of the pending objections and rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

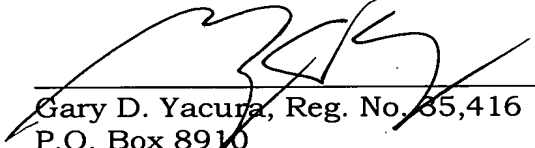
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned, at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKY, & PIERCE, P.L.C.

By

  
\_\_\_\_\_  
Gary D. Yacura, Reg. No. 35,416  
P.O. Box 8910  
Reston, Virginia 20195  
(703) 668-8000

EGP  
GDY/EGP:mk

1098520.1

PTO/SB/06 (07-06)

Approved for use through 1/31/2007. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/310,660</b>		Filing Date <b>05/29/2009</b>		<input type="checkbox"/> To be Mailed		
<b>APPLICATION AS FILED – PART I</b>											
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/>		OR		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)					
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A		N/A						
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A		N/A						
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A		N/A						
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$	=	X \$	=					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=	X \$	=					
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).										
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))											
			TOTAL		TOTAL						
<b>APPLICATION AS AMENDED – PART II</b>											
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT	01/26/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X \$	=	X \$52=	0		
	Independent (37 CFR 1.16(h))	* 4	Minus	***3	= 1	X \$	=	X \$220=	220		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))											
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
					TOTAL ADD'L FEE		TOTAL ADD'L FEE	<b>220</b>			
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$	=	X \$	=		
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$	=	X \$	=		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))											
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
					TOTAL ADD'L FEE		TOTAL ADD'L FEE				
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>											

Legal Instrument Examiner:  
/CURTIS NELLOMS JR/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600
30594 7590 03/31/2011 HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			EXAMINER DUONG, FRANK	
			ART UNIT	PAPER NUMBER
			2474	
			MAIL DATE	DELIVERY MODE
			03/31/2011	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

12/310,660

**Applicant(s)**

YIN ET AL.

**Examiner**

Frank Duong

**Art Unit**

2474

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11, 13 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-11, 13 and 15-17 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 2

### **DETAILED ACTION**

1. This Office Action is a response to communications dated 01/26/11. Newly amended claims 1-11, 13, and 15-17 are still pending in the application. The newly amended claims appear to clearly define at least two different, independent, and distinctive claimed invention. As a result, a restriction requirement is required as hereinbelow.

### ***Election/Restrictions***

2. This application contains claims directed to the following patentably distinct species of the claimed invention:

Embodiment 1 described in page 10, line 21 to page 11, line 8, referenced to Fig.

2.

Embodiment 2 described in page 16, line 16 to page 20, line 5, referenced to Fig. 5 and Fig. 6.

3. The species are independent or distinct because the claims to the different species recite the mutually exclusive characteristics of such species. For example, the feature of updating the remaining time of a route table item to a predefined using time is exclusively disclosed for the first species, not the second species. On the other hand, the feature of sending the packet to the gateway of said corresponding subnetwork via a forwarding port is exclusively disclosed for the second species, not the first species. These features do require a different field of search. In addition, these species are not obvious variants of each other based on the current record.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 3

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic claim.

4. There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply:

The species require a different field of search, i.e., class 370, subclass 395.31 per subject matters including routing table, and class 370, subclass 351 per subject matters pertaining pathfinding or routing..

**Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or a grouping of patentably indistinct species to be examined** even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

5. The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the

Application/Control Number: 12/310,660

Page 4

Art Unit: 2474

election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank Duong whose telephone number is 571-272-3164. The examiner can normally be reached on 7:00AM-3:30PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Moe S. Aung can be reached on 571-272-7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number: 12/310,660


Page 5

Art Unit: 2474

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Frank Duong/  
Primary Examiner, Art Unit 2474  
March 28, 2011



<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  Frank Duong	<b>Art Unit</b>  2474

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input checked="" type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>				<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>	
CLAIM		DATE							
Final	Original	10/18/2010	03/28/2011						
	1	✓	÷						
	2	✓	÷						
	3	O	÷						
	4	✓	÷						
	5	✓	÷						
	6	✓	÷						
	7	✓	÷						
	8	O	÷						
	9	✓	÷						
	10	✓	÷						
	11	✓	÷						
	12	✓	-						
	13	✓	÷						
	14	✓	-						
	15	✓	÷						
	16	✓	÷						
	17	✓	÷						



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## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA; <b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007 <b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> CHINA	<b>SHEETS DRAWINGS</b> 6	<b>TOTAL CLAIMS</b> 17	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b> Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b> 1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

JFW

**PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant:	Qin YIN et al.	Confirmation No.:	2600
Application No.:	12/310,660	Examiner:	Frank Duong
Filing Date:	May 29, 2009	Group Art Unit:	2474
Title:	METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES		
Attorney Docket:	29250H-000013/US		

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**RESPONSE TO RESTRICTION REQUIREMENT**

Customer Service Window  
 Randolph Building  
 401 Dulany Street  
 Alexandria, VA 22314  
**Mail Stop Amendment**

April 29, 2011

Dear Sir:

Responsive to the Examiner's Restriction Requirement dated March 31, 2011, the following remarks are respectfully submitted in connection with the above-referenced application.

**A listing of the Claims** begin on page 2 of this Amendment.

**Remarks** begin on page 8 of this Amendment.

	Claims remaining after		Highest number previously paid for		Present extra
<b>Total</b>	15	-	20	=	0
<b>Independent</b>	4	-	4	=	0

Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 2

**AMENDMENTS TO THE CLAIMS**

The following is a complete, marked up listing of revised claims with a status identifier in parentheses, underlined text indicating insertions, and strikethrough and/or double-bracketed text indicating deletions.

**LISTING OF CLAIMS:**

1. (Previously Presented) A method, in an access device of the communication network, for managing route information, comprising:

receiving an access response message from a server;  
obtaining route-related information from said access response message; and  
updating a route table item in a route table based on said route-related information.

2. (Previously Presented) The method according to claim 1, wherein said obtaining includes obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route; and

wherein the updating is further based on said predefined using time.

3. (Previously Presented) The method according to claim 2, further comprising:

determining whether the route table item corresponding to said route-related information exists in said route table;

updating a remaining time of the route table item if the determining determines that the route table item corresponding to said route-related information exists in said

Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 3

route table and the remaining time of said route table item is shorter than said predefined using time; and

creating a route table item corresponding to the route-related information if the determining determines that the route table item corresponding to said route-related information does not exist in the route table.

4. (Previously Presented) The method according to claim 1, further comprising:

obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message; wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. (Previously Presented) The method according to claim 1, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. (Currently Amended) A route management apparatus, in an access device of the communication network, for managing route information, comprising:

a receiver configured to receive an access response message from a server;

a first obtainer configured to obtain said route-related information from said access response message; and

a route maintainer configured to update a route table based on said route-related information.

7. (Previously Presented) The apparatus according to claim 6, wherein said obtainer is further configured to obtain a predefined using time from said access response message, said predefined using time indicates the using time of said router; and said route maintainer is further configured to update said route table item further based on said predefined using time.

8. (Previously Presented) The apparatus according to claim 6, wherein said route maintainer includes:

a first judger configured to judge whether the route table item corresponding to said route-related information exists in said route table;

a second judger configured to judge whether a remaining time of said route table item is shorter than said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table;

an updater configured to update the remaining time of said route table item to said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table and the second judger judges that the remaining time of said route table item is shorter than said predefined using time;

Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 5

a creator configured to create the route table item corresponding to said route-related information if the first judger judges that no route table item corresponding to said route-related information exists in said route table.

9. (Previously Presented) The apparatus according to claim 6, further comprising:

a second obtainer configured to obtain correlated information of said route table item and a virtual local area network; wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. (Previously Presented) The apparatus according to claim 6, wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

11. (Previously Presented) A method, in an access device of the communication network, for forwarding data, comprising:

receiving a packet from a user terminal, the packet including a source network address and a destination network address;

determining a gateway that has access to a destination network corresponding with the destination network address;

Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 6

determining a forwarding port of the gateway based on comparing the destination network address to a route table; and  
sending the packet to the gateway via the forwarding port.

12. (Cancelled)

13. (Previously Presented) A forwarding apparatus, in an access device of the communication network, for forwarding data, comprising:

a receiver configured to receive a packet from a user terminal, the packet including a source network address and a destination network address;

a processor configured to determine a gateway that has access to a destination network corresponding with the destination network address, the processor further configured to a forwarding port of the gateway based on comparing the destination network address to a route table; and

a transmitter configured to transmit the packet to the gateway via the forwarding port.

14. (Cancelled)

15. (Original) An access device in the communication network, wherein said access device comprises a route management apparatus according to claim 6.



Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 7

16. (Previously Presented) The device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

17. (Previously Presented) The access device in the communication network, wherein said access device comprises the forwarding apparatus according to claim 13.

Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 8

**REMARKS**

The Examiner required election of one of the following species:

- I. Embodiment 1 described in page 10, line 21 to page 11, line 8, referenced to FIG. 2; and
- II. Embodiment 2 described in page 16, line 16 to page 20, line 5, references to FIG. 5 and FIG. 6.

In response to the Examiner's restriction/election requirement, Applicant elects, with traverse, to prosecute Group I including claim 1-10. Applicant specifically reserves the right to file a divisional application directed to non-elected claims 11, 13 and 15-17.

With respect to Applicant's traversal, Applicant respectfully directs the Examiner's attention to M.P.E.P. § 803 which states:

"If the search and examination of an entire application can be made without serious burden, the Examiner must examine on the merits, even though it includes claims too distinct or independent invention." (emphasis added)

There are two criteria for a proper requirement for restriction. The invention should be independent or distinct, and

"2) there must be a serious burden on the Examiner if a restriction is not required. See M.P.E.P. §803.092, 806.04 A through J, 808.01(a) and 808.02."

Applicant respectfully submits that the Examiner would not be unduly burdened if forced to examine Embodiments 1 and 2 because the Examiner has already performed a search for both species in issuing the Office Action dated October 26, 2010.

Attorney Docket No: 29250H-000013/US  
Application No. 12/310,660  
Page 9

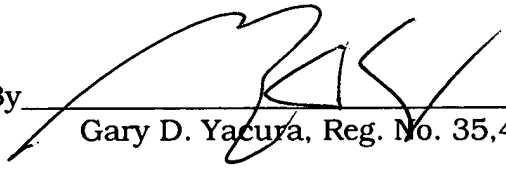
For all of the above stated reasons, reconsideration and withdrawal of the outstanding restriction/election requirement and favorable allowance of all claims in the instant application are earnestly solicited.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKY & PIERCE, PLC

By

  
\_\_\_\_\_  
Gary D. Yacura, Reg. No. 35,416

P.O. Box 8910  
Reston, VA 20195

  
GDY/EGP/ame

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/310,660</b>		Filing Date <b>05/29/2009</b>		<input type="checkbox"/> To be Mailed		
<b>APPLICATION AS FILED – PART I</b>											
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/>		OR		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)	
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A		N/A		N/A		N/A		
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A		N/A		N/A		N/A		
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A		N/A		N/A		N/A		
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$	=	OR	X \$	=	X \$	=		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=	OR	X \$	=	X \$	=		
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).										
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))											
* If the difference in column 1 is less than zero, enter "0" in column 2.											
<b>APPLICATION AS AMENDED – PART II</b>											
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT	04/29/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X \$	=	OR	X \$52=	0		
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X \$	=	OR	X \$220=	0		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))											
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0		
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT	Total (37 CFR 1.16(i))	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$	=	OR	X \$	=		
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$	=	OR	X \$	=		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))											
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.											
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".											
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".											
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.											

Legal Instrument Examiner:  
/BONNIE COLE/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

30594 7590 07/19/2011  
 HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

EXAMINER
----------

DUONG, FRANK

ART UNIT	PAPER NUMBER
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2474

MAIL DATE	DELIVERY MODE
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07/19/2011

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

12/310,660

**Applicant(s)**

YIN ET AL.

**Examiner**

FRANK DUONG

**Art Unit**

2474

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 January 2011 and 29 April 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11, 13 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) 11, 13 and 17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 15 and 16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 2

### DETAILED ACTION

1. This Office Action is a response to communications dated 01/26/11 and 04/29/11. Claims 1-11, 13, and 14-17 are still pending in the application. Elected claims 1-10 and 15-16 are examined on the merits. Non-elected claims 11, 13 and 17 will be withdrawn from further consideration. The Applicants are advised to cancel non-elected claims 11, 13 and 17 in a response to this Office Action to expedite the prosecution, should the response place the instant application in a favorable condition for allowance.

### ***Election/Restrictions***

2. Applicant's election with traverse of Embodiment I including claims 1-10 and 15-16 (not claims 1-10 as asserted by the Applicants) in the reply filed on 04/29/11 is acknowledged. The traversal is on the ground(s) that “*the examiner would not be unduly burdened if forced to examine Embodiments 1 and 2 because the examiner **has already performed a search for both species.***” This is not found persuasive because of the following rationales.

First, the claimed invention of Embodiment 2 including claims 11, 13 and 17, introduced in the amendment dated 01/26/11, has not been search.

Second, the claimed invention of Embodiment 2, as clearly pointed out in the restriction requirement dated 03/31/11, is independent or distinct because the claims to the different species recite the mutually exclusive characteristics of such species for a specific limitation indicated in the Office Action dated 03/31/11.

Third, the species require a different field of search.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 3

For at least one of the above rationales, it would be a serious burden on the examiner if a restriction is not required.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-10 and 15-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-10 and 15-16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted step is: "*judging whether the remaining time of said route table item is shorter than said predefined using time,*" depicted as block S14 in Figure 2 and disclosed on page 11 of the specification. It is reminded that the Applicants are entitled to claim a broad invention, not an incomplete invention. The Applicants are advised to further amend the claims to incorporate the omitting step in a response to this Office Action to overcome this outstanding rejection.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:



Application/Control Number: 12/310,660

Page 4

Art Unit: 2474

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-2, 4-7, 9-10 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolli et al (PGPUB 2008/0212598) (hereinafter "Kolli") in view of Hall (US 2002/0138614).

Regarding **claim 1**, in accordance with Kolli reference entirety, Kolli teaches a method, in an access device (*Fig. 4; 426&410 and description starting at para [0047] and thereafter or Fig. 11a; 1120*) of the communication network (1100), for managing

Application/Control Number: 12/310,660

Page 5

Art Unit: 2474

route information (*para [0073]-[0075]*), comprising: receiving an access response message (1176) from a server (1170) (*para [0075]*, *it is discussed the DHCP server 1170 sends a DHCP reply 1176 back to the transparent virtual router 1120 and requesting host 1120 or CPE 1130*); obtaining route-related information from said access response message (1176) (*para [0075]*, *it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration*). It appears that Kolli fails to explicitly disclose the limitation of "*updating a route table item in a route table based on said route-related information*." However, such limitation lacks thereof from Kolli is well known in the art and taught by Hall.

In an analogous art and the same field of endeavor, Hall teaches a method to manage network addresses comprising, among other things, the limitation of "*updating a route table item in a route table based on said route-related information*" ('614, Fig. 4; block 408 and *para [0032]* and thereafter).

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to modify Kolli's teaching or to incorporate Hall's into Kolli's to arrive the claimed invention. A motivation for doing so would be to remedy the problems existing in the prior art associating with the dynamic assignment of network addresses ('614, *para [0003]* and thereafter).

Regarding **claim 2**, in addition to features recited in base claim 1 (see rationales discussed above), Kolli in view of Hall also discloses wherein said obtaining includes obtaining a predefined using time from said access response message, said predefined

Application/Control Number: 12/310,660

Page 6

Art Unit: 2474

using time indicates a using time of said route ('598, para [0075], it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration or '614, para [0037]); wherein the updating is further based on said predefined using time ('598, para [0075], lease time is inspected or snooped by the transparent virtual router 1120 and it is configured to the route table by the transparent virtual router 1120 or '614, para [0037], it is disclosed the assignment identifiers comprise time periods).

Regarding **claim 4**, in addition to features recited in base claim 1 (see rationales discussed above), Kolli in view of Hall also discloses obtaining correlated information of said route table item and a virtual local area network (VLAN) from an address resolution protocol (ARP) message ('598, *IP Subnets corresponding to VLAN is discussed at para [0060], and ARP is discussed at para [0080] and thereafter*) or an access response message (*DHCP reply 1176*) ('598, para [0075], it is disclosed the transparent virtual router 1120 inspects or snoops the DHCP reply 1176 to ascertain which IP address has been assigned and the duration of such assignment. It then configures this information into the routing table for the application TVR group); wherein said virtual local area network (VLAN) configuration is employed between said access device ('598, Fig. 4; CPE 412) and each marginal router ('598, Fig. 4; 460 or 452) connected with said access device ('598, Fig. 4; CPE 412) ('598, Fig. 4 for connection details).

Regarding **claim 5**, in addition to features recited in base claim 1 (see rationales discussed above), Kolli in view of Hall also discloses wherein said access response message refers to a dynamic host configuration protocol response message ('598,

Application/Control Number: 12/310,660  
 Art Unit: 2474

Page 7

*DHCP reply 1176*), said predefined using time refers to the lease time in said dynamic host configuration protocol response message ('598, *para [0075], DHCP reply 1176 and lease time are discussed*).

*(Note: Claims 6-7, 9-10 and 15-16 call for an apparatus having limitations mirrored method steps of method claims 1-2 and 4-5. Thus, they are deemed obvious by Kolli in view of Hall for the same rationales applied to claims 1-2 and 4-5 as discussed above and below)*

Regarding **claims 6 and 15-16**, in accordance with Kolli reference entirety, Kolli shows a route management apparatus (*Fig. 4; 426&410 and description starting at para [0047] and thereafter or Fig. 11a; 1120*), in an access device of the communication network having therein a DSLAM (*para [0047]*), for managing route information, comprising: a receiver, configured to receive an access response message (1176) from a server (1120) (*para [0075], it is discussed the DHCP server 1170 sends a DHCP reply 1176 back to the transparent virtual router 1120 and requesting host 1120 or CPE 1130*); a first obtainer, configured to obtain said route-related information from said access response message (1176) (*para [0075], it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration*). It appears that Kolli fails to explicitly disclose "a route maintainer, configured to update a route table based on said route-related information." However, such limitation lacks thereof from Kolli is well known in the art and taught by Hall.

In an analogous art and the same field of endeavor, Hall teaches a method to manage network addresses comprising, among other things, the limitation of "a route

Application/Control Number: 12/310,660

Page 8

Art Unit: 2474

*maintainer, configured to update a route table based on said route-related information "*  
*('614, Fig. 4; block 408 and para [0032] and thereafter).*

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to modify Kolli's teaching or to incorporate Hall's into Kolli's to arrive the claimed invention. A motivation for doing so would be to remedy the problems existing in the prior art associating with the dynamic assignment of network addresses (*'614, para [0003] and thereafter*).

Regarding **claim 7**, in addition to features recited in base claim 6 (see rationales discussed above), Kolli in view of Hall also discloses wherein said obtainer further configured to obtain a predefined using time from said access response message, said predefined using time indicates the using time of said router; wherein, said route maintainer is further configured to update said route table item further based on said predefined using time (*'598, para [0075], it is also discussed the transparent virtual router 1120 inspects or snoops the DHCP reply message 1176 to ascertain which IP address has been assigned and the lease duration. In addition, para [0075], lease time is inspected or snooped by the transparent virtual router 1120 and it is configured to the route table by the transparent virtual router 1120 or '614, para [0037], it is disclosed the assignment identifiers comprise time periods*).

Regarding **claim 9**, in addition to features recited in base claim 6 (see rationales discussed above), Kolli also discloses a second obtainer configured to obtain correlated information of said route table item and a virtual local area network (*'598, para [0075], it is further discussed the transparent virtual router 1120 then configures this information*

Application/Control Number: 12/310,660

Page 9

Art Unit: 2474

*into the routing table or an entry is added to the route table. In addition, IP Subnets corresponding to VLAN is discussed at para [0060]); wherein said virtual local area network (VLAN) configuration is employed between said access device ('598, Fig. 4; CPE 412) and each marginal routers ('598, Fig. 4; 460 or 452) connected with said access device ('598, Fig. 4; CPE 412) ('598, Fig. 4 for connection details)*

Regarding **claim 10**, in addition to features recited in base claim 6 (see rationales discussed above), Kolli in view of Hall also discloses wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol response message ('598, para [0075], DHCP reply 1176 and lease time are discussed thereat).

#### ***Allowable Subject Matter***

5. Claims 3 and 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, considered individually or in combination, appears to fail to fairly show or suggest a claimed invention of base claims 1 and 6, and further limits with novel and unobvious limitations as recited in the dependent claims 3 and 8, structurally and functionally interconnected with other limitations in a manner as claimed.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 10

***Response to Arguments***

7. Applicant's arguments with respect to claims 1-10 and 15-16 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK DUONG whose telephone number is (571)272-3164. The examiner can normally be reached on 7:00AM-3:30PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Moe S. Aung can be reached on 571-272-7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number: 12/310,660

Page 11

Art Unit: 2474

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Frank Duong/  
Primary Examiner, Art Unit 2474  
July 17, 2011



<b>Notice of References Cited</b>	Application/Control No. 12/310,660	Applicant(s)/Patent Under Reexamination YIN ET AL.	
	Examiner FRANK DUONG	Art Unit 2474	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0138614	09-2002	Hall, Dennis W.	709/225
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**


*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  Frank Duong	<b>Art Unit</b>  2474

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input checked="" type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>						<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>	
CLAIM		DATE									
Final	Original	10/18/2010	03/28/2011	07/17/2011							
	1	✓	÷	✓							
	2	✓	÷	✓							
	3	O	÷	O							
	4	✓	÷	✓							
	5	✓	÷	✓							
	6	✓	÷	✓							
	7	✓	÷	✓							
	8	O	÷	O							
	9	✓	÷	✓							
	10	✓	÷	✓							
	11	✓	÷	N							
	12	✓	-	-							
	13	✓	÷	N							
	14	✓	-	-							
	15	✓	÷	✓							
	16	✓	÷	✓							
	17	✓	÷	N							

<b>Search Notes</b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  FRANK DUONG	<b>Art Unit</b>  2474

### SEARCHED

Class	Subclass	Date	Examiner
370		7/17/2011	FD

### SEARCH NOTES

Search Notes	Date	Examiner
Updated EAST Search (see printout)	7/17/2011	FD
Updated Inventorship Search (see printout)	7/17/2011	FD
Updated IEEE/Internet Search	7/17/2011	FD
Updated class 370/351-357,389,392,395.5-395.54,464-467 (text search only-see printout)	7/17/2011	FD

### INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

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## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA; <b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007 <b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> CHINA	<b>SHEETS DRAWINGS</b> 6	<b>TOTAL CLAIMS</b> 17	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b> Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b> 1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	18843	VLAN or (virtual near3 ((local adj area) or LAN))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:58
L2	1779	1 and (DHCP or (dynamic adj host adj configuration))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:58
L3	605	2 and (arp or (address adj resolution))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:58
L4	571	3 and ((forward\$4 or switch \$4) and (gateway or rout \$4))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:59
L5	562	4 and ((IP or "internet protocol" or (destination and source)) same address)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:59
L6	143	5 and 370/351-357,389,392,395.5-395.54,464-467.ccls.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:59
L7	77	6 and (rout\$4 near3 table)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 20:00

**7/ 17/ 2011 8:00:33 PM**

**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	5	Yin-Qin.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:17
L2	2	Miu-Yingzhong. in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:18
L3	63	Zhu-Jianhua.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:18
L4	2	Yao-Yifeng.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2011/07/17 19:18

**7/ 17/ 2011 7:18:19 PM**

AFTJRW

**PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660                      Group Art Unit: 2474

Filing Date: May 29, 2009                      Examiner: Frank Duong

Applicant: Qin YIN et al.

Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES

Attorney Docket: 29250H-000013/US

Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
**Mail Stop AF**

October 19, 2011

**RESPONSE UNDER 37 C.F.R. §1.116**

Sir or Madam:

In response to the final Office Action mailed July 19, 2011, the following remarks are respectfully submitted in connection with the above-identified application.

**Listing of the Claims** begin on page 2 of this Response.

**Remarks** begin on page 7 of this Response.

	<b>Claims remaining after Response</b>		<b>Highest number previously paid for</b>		<b>Present extra</b>
<b>Total</b>	15	-	20	=	0
<b>Independent</b>	4	-	4	=	0

**LISTING OF THE CLAIMS**

The following is a complete listing of the revised claims with a status identifier in parenthesis.

**LISTING OF CLAIMS**

1. (Previously Presented) A method, in an access device of the communication network, for managing route information, comprising:
  - receiving an access response message from a server;
  - obtaining route-related information from said access response message; and
  - updating a route table item in a route table based on said route-related information.
2. (Previously Presented) The method according to claim 1, wherein said obtaining includes obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route; and
  - wherein the updating is further based on said predefined using time.
3. (Previously Presented) The method according to claim 2, further comprising:
  - determining whether the route table item corresponding to said route-related information exists in said route table;
  - updating a remaining time of the route table item if the determining determines that the route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time; and
  - creating a route table item corresponding to the route-related information if the



determining determines that the route table item corresponding to said route-related information does not exist in the route table.

4. (Previously Presented) The method according to claim 1, further comprising:

obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message; wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. (Previously Presented) The method according to claim 1, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. (Previously Presented) A route management apparatus, in an access device of the communication network, for managing route information, comprising:

a receiver configured to receive an access response message from a server;  
a first obtainer configured to obtain said route-related information from said access response message; and  
a route maintainer configured to update a route table based on said route-related information.

7. (Previously Presented) The apparatus according to claim 6, wherein said obtainer is further configured to obtain a predefined using time from said access response message, said predefined using time indicates the using time of said router; and

said route maintainer is further configured to update said route table item further

based on said predefined using time.

8. (Previously Presented) The apparatus according to claim 6, wherein said route maintainer includes:

a first judger configured to judge whether the route table item corresponding to said route-related information exists in said route table;

a second judger configured to judge whether a remaining time of said route table item is shorter than said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table;

an updater configured to update the remaining time of said route table item to said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table and the second judger judges that the remaining time of said route table item is shorter than said predefined using time;

a creator configured to create the route table item corresponding to said route-related information if the first judger judges that no route table item corresponding to said route-related information exists in said route table.

9. (Previously Presented) The apparatus according to claim 6, further comprising:

a second obtainer configured to obtain correlated information of said route table item and a virtual local area network;

wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. (Previously Presented) The apparatus according to claim 6, wherein said access response message refers to a dynamic host configuration protocol, said predefined

using time refers to the lease time in said dynamic host configuration protocol response message.

11. (Withdrawn-Previously Presented) A method, in an access device of the communication network, for forwarding data, comprising:

receiving a packet from a user terminal, the packet including a source network address and a destination network address;

determining a gateway that has access to a destination network corresponding with the destination network address;

determining a forwarding port of the gateway based on comparing the destination network address to a route table; and

sending the packet to the gateway via the forwarding port.

12. (Cancelled).

13. (Withdrawn-Previously Presented) A forwarding apparatus, in an access device of the communication network, for forwarding data, comprising:

a receiver configured to receive a packet from a user terminal, the packet including a source network address and a destination network address;

a processor configured to determine a gateway that has access to a destination network corresponding with the destination network address, the processor further configured to a forwarding port of the gateway based on comparing the destination network address to a route table; and

a transmitter configured to transmit the packet to the gateway via the forwarding port.

14. (Cancelled).

15. (Original) An access device in the communication network, wherein said access device comprises a route management apparatus according to claim 6.

16. (Previously Presented) The device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

17. (Withdrawn-Previously Presented) The access device in the communication network, wherein said access device comprises the forwarding apparatus according to claim 13.

**REMARKS**

Favorable reconsideration of this application, in light of the following remarks, is respectfully requested.

Claims 1-11, 13 and 15-17 are pending in this application.

**Allowable Subject Matter**

Applicants note with appreciation that the Examiner has deemed claims 3 and 8 as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicants choose not to amend the claims at this time at least for the reasons detailed below.

**Rejections under 35 U.S.C. § 112**

Claims 1-10 and 15-16 stand rejected under 35 USC § 112, ***second paragraph***, as being indefinite. This rejection is respectfully traversed.

A feature which is taught as critical in a specification and is not recited in the claims should result in a rejection of such claim under the enablement provision section of 35 U.S.C. 112. See *In re Mayhew*, 527 F.2d 1229, 1233, 188 USPQ 356, 358 (CCPA 1976). **In determining whether an unclaimed feature is critical, the entire disclosure must be considered. Features which are merely preferred are not to be considered critical.** *In re Goffe*, 542 F.2d 564, 567, 191 USPQ 429, 431 (CCPA 1976).

**Limiting an applicant to the preferred materials** in the absence of limiting prior art **would not serve the constitutional purpose** of promoting the progress in the useful arts. Therefore, an enablement rejection based on the grounds that a disclosed critical limitation is missing from a claim should be made **only when the language of the specification makes it clear that the limitation is critical for the invention to function as intended.** Broad language in the disclosure, including the abstract, omitting an allegedly critical feature, tends to **rebut the argument of criticality**. See MPEP 2164.08(c).

(Emphasis added.)

Applicants respectfully submit that the language of the specification do not make it clear that the steps recited by the Examiner are critical for the invention to

function as intended. For example, page 11 of the subject specification states “**if** said access response message **further comprises** the predefined using time ...” clearly infers that the additional steps **may** occur **if** the additional condition is met. Therefore, the rejection under 35 USC § 112, second paragraph is improper.

Applicants, therefore, respectfully request that the rejection to the above claims under 35 U.S.C. § 112 be withdrawn.

### **Rejections under 35 U.S.C. § 103**

Claims 1-2, 4-7, 9-10 and 15-16 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2008/0212598 (“Kolli”) in view of U.S. Patent Application Publication No. 2002/0138614 (“Hall”). Applicants respectfully traverse this rejection for the reasons detailed below.

The Examiner admits that Kolli does not disclose “updating a route table item in a route table based on said route-related information,” as recited in claim 1. The Examiner instead relies on Hall to disclose the aforementioned limitation. Applicants respectfully disagree. In making the aforementioned rejection, the Examiner relies on paragraph [0032] of Hall.

Paragraph [0032] of Hall states:

FIG. 4 is a second block flow diagram of the programming logic performed by a client proxy module in accordance with one embodiment of the invention. FIG. 4 illustrates a process 400 that may be representative of the processing logic illustrated in block 308. As shown in process 400, a client request for a network address is received at block 402. A unique identifier is created for the client at block 404. A determination is made as to whether the client request is successful at block 406. If the client request is not successful, the processing logic ends. **If the client request is successful, however, a network address and associated information is stored in an address assignment table at block 408.** The network address is sent to the client at block 412. Process 400 then ends.

(Emphasis added).

Clearly Hall discloses a client requested network address is received by a client proxy. If the request is successful (e.g., a valid network address has been returned from a network address provider), the network address and associated information is stored in an assignment table. As in Kolli, Hall **only discloses creating new route table items**, and is silent in regards to **“updating an existing route table item”** as required by claim 1.

For at least the reasons described above, Kolli and Hall, alone and in combination (assuming *arguendo* that Hall could be combined with Kolli, which the Applicants do not admit), do not teach or fairly suggest each and every limitation of claim 1. Because Kolli and Hall do not teach or fairly suggest each and every limitation of claim 1, Kolli in view Hall does render claim 1 obvious. As a result the Examiner has not established a prima facie case of obviousness in rejecting claim 1. Claim 6 is patentable for reasons at least somewhat similar to those discussed above with regard to claim 1, noting that claim 6 should be interpreted solely based on the limitations set forth therein. Claims 2, 4, 5, 7, 9-10 and 15-16 are patentable at least by virtue of their dependency from an allowable base claim.

The Applicants, therefore, respectfully request reconsideration and withdrawal of the rejection to claims 1-2, 4-7, 9-10 and 15-16 under 35 U.S.C. § 103(a).

**CONCLUSION**

In view of the above remarks, the Applicants respectfully submit that each of the pending objections and rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

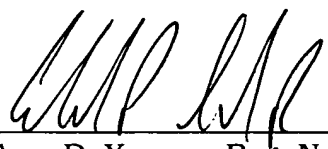
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned, at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKY, & PIERCE, P.L.C.

By

 256 ± 62496  
\_\_\_\_\_  
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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/310,660</b>		Filing Date <b>05/29/2009</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$	=		X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
			TOTAL			TOTAL				
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	10/19/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	=	0		X \$60=	0	
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	=	0		X \$250=	0	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE			TOTAL ADD'L FEE	0	
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	Total (37 CFR 1.16(i))	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=			X \$	=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=			X \$	=	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE			TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:  
/JEFFERY L. OLSEN/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600
30594	7590	10/31/2011		
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			EXAMINER DUONG, FRANK	
			ART UNIT 2474	PAPER NUMBER
			MAIL DATE 10/31/2011	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b><i>Advisory Action Before the Filing of an Appeal Brief</i></b>	<b>Application No.</b> 12/310,660	<b>Applicant(s)</b> YIN ET AL.	
	<b>Examiner</b> FRANK DUONG	<b>Art Unit</b> 2474	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 19 October 2011 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

- a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.  
b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on \_\_\_\_\_. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

#### AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because  
(a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);  
(b) ☐ They raise the issue of new matter (see NOTE below);  
(c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or  
(d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: \_\_\_\_\_. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).  
5. ☐ Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.  
6. ☐ Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).  
7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.  
The status of the claim(s) is (or will be) as follows:  
Claim(s) allowed: \_\_\_\_\_.  
Claim(s) objected to: \_\_\_\_\_.  
Claim(s) rejected: \_\_\_\_\_.  
Claim(s) withdrawn from consideration: \_\_\_\_\_.

#### AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).  
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).  
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

#### REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because:  
The arguments in the response filed on 10/19/11 has been carefully reviewed and considered, but not persuasive. Pertaining the rejection of claims 1-10 and 15-16 under 35 USC § 112, second paragraph, as being indefinite for omitting the step of "judging whether the remaining time of said route table item is shorter than said predefined using time," as depicted as block S14 in Figure 2 and disclosed on page 11 of the specification, resulting in a gap between the steps of the claimed process, the Applicants argue "page 11 of the subject specification states "if said access response message further comprises the predefined using time ..." clearly infers that the additional steps may occur " if the additional condition is met. Therefore, the rejection under 35 USC § 112, second paragraph is improper." The argument is noted, but not persuasive. First, the claimed method calls for the steps of "receiving an access response message from a server; obtaining route-related information from said access response message; and updating a route table item in a route table based on said route-related information." It has nothing to do with the "predefined using time" as argued by the Applicants. Second, in order for the updating to be sequentially flowed next in the claimed process and the "predefined time using" to include in the process, the disclosed process step S14 of Fig. 2 must be included in the claimed process. Therefore, in a response to this Office Action, the Applicants should either amend the claimed to include the "predefined time using" or step S14 of the disclosed process of Fig. 2. Pertaining the rejection of claims 1-2, 4-7, 9-10 and 15-16 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2008/0212598 ("Kolli") in view of U.S. Patent Application Publication No. 2002/0138614 ("Hall"), the Applicants argue that "Clearly Hall discloses a client requested network address is received by a client proxy. If the request is successful (e.g., a valid network address has been returned from a network address provider), the network address and associated information is stored in an assignment table. As in Kolli, Hall only discloses creating new route table items, and is silent in regards to "updating an existing route table item" as required by claim 1." The argument is noted but not persuasive because the rejected claims fail to clearly reflect the

Continuation Sheet (PTOL-303)

Application No.

/Frank Duong/  
Primary Examiner, Art Unit 2474

U.S. Patent and Trademark Office  
PTOL-303 (Rev. 08-06)

**Advisory Action Before the Filing of an Appeal Brief**

Part of Paper No. 20111028



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## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA;						
<b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007						
<b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006						
<b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> CHINA	<b>SHEETS DRAWINGS</b> 6	<b>TOTAL CLAIMS</b> 17	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b> Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b> 1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

AFTJRW

**PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660 Group Art Unit: 2474

Filing Date: May 29, 2009 Examiner: Frank Duong

Applicant: Qin YIN et al.

Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES

Attorney Docket: 29250H-000013/US

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October 19, 2011

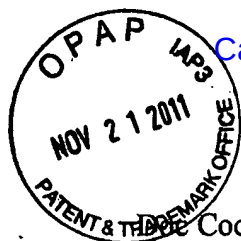
**RESPONSE UNDER 37 C.F.R. §1.116**

Sir or Madam:

In response to the final Office Action mailed July 19, 2011, the following remarks are respectfully submitted in connection with the above-identified application.

**Listing of the Claims** begin on page 2 of this Response.**Remarks** begin on page 7 of this Response.

	<b>Claims remaining after Response</b>		<b>Highest number previously paid for</b>		<b>Present extra</b>
<b>Total</b>	15	-	20	=	0
<b>Independent</b>	4	-	4	=	0



Form Code: AP.PRE.REQ

PTO/SB/33 (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

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**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

Docket Number (Optional)

29250H-000013/US

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on \_\_\_\_\_

Signature \_\_\_\_\_

Typed or printed  
name \_\_\_\_\_

Application Number

12/310,660

Filed

May 29, 2009

First Named Inventor

Qin YIN et al.

Art Unit

2474

Examiner

Frank Duong

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐

applicant/inventor.

☐

assignee of record of the entire interest.

See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.  
(Form PTO/SB/96)

☒

attorney or agent of record.

Registration number 35,416

☐

attorney or agent acting under 37 CFR 1.34.

Registration number if acting under 37 CFR 1.34 \_\_\_\_\_

Signature

Gary D. Yacura, Reg. No. 35,416

Typed or printed name

703-668-8000

Telephone number

November 21, 2011

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☐

\*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660                      Group Art Unit: 2474  
Filing Date: May 29, 2009                      Examiner: Frank Duong  
Applicant: Qin YIN et al.  
Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES  
Attorney Docket: 29250H-000013/US

Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
**Mail Stop AF**

November 21, 2011

**REASONS FOR PRE-APPEAL REQUEST FOR REVIEW**

Dear Sir:

In response to the Final Office Action mailed on July 19, 2011 ("Office Action") and the Advisory Action mailed on October 31, 2011 ("Advisory Action"), Applicants request that the Pre-Appeal Brief Review Panel (hereinafter Panel) review the pending rejections. The Reasons for Pre-Appeal Brief Request for Review are being filed concurrently with the Pre-Appeal Brief Request for Review and a Notice of Appeal.

Claims 1-11, 13 and 15-17 are pending in the current Application. Claims 11, 13 and 17 are withdrawn from consideration. Claims 1-10, 15 and 16 stand rejected. Claims 1, 6, 11 and 13 are the independent claims.

**Applicants respectfully note that the Examiner maintains the rejections made in the July 19, 2011 Office Action. Therefore, the Applicants comments**

**made in the October 19, 2011 response are relevant for the analysis by the Pre-Appeal Brief Review Panel.<sup>1</sup>**

**Rejections For Which Conference Is Requested**

**35 U.S.C. § 103(a)**

A Pre-Appeal Brief Conference is respectfully requested to review the rejection to claims 1-2, 4-7, 9-10 and 15-16 as being unpatentable over U.S. Patent Application Publication No. 2008/0212598 ("Kolli") in view of U.S. Patent Application Publication No. 2002/0138614 ("Hall"). For the reasons detailed below, withdrawal of the current rejections is requested.

The Examiner asserts Applicant's argument that Hall does not disclose "updating a route table item in a route table based on said route-related information," as recited in claim 1 is not persuasive. The Examiner states that the argument is "not persuasive because the rejected claims fail to clearly reflect the ..." The Examiner clearly intended to further elaborate his reasons. However, the Advisory Action does not include the elaborated reasons. See the continuation sheet (PTOL-303) of the Advisory Action mailed October 31, 2011.

With regard to the argued limitation of claim 1 which states "updating a route table item in a route table based on said route-related information," Hall discloses at most a client requested network address is received by a client proxy. If the request is successful (e.g., a valid network address has been returned from a network address provider), the network address and associated information is stored in an assignment table.

For example, paragraph [0032] of Hall states:

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<sup>1</sup> See pages 7-9 of the Response dated October 19, 2011.

Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

FIG. 4 is a second block flow diagram of the programming logic performed by a client proxy module in accordance with one embodiment of the invention. FIG. 4 illustrates a process 400 that may be representative of the processing logic illustrated in block 308. As shown in process 400, a client request for a network address is received at block 402. A unique identifier is created for the client at block 404. A determination is made as to whether the client request is successful at block 406. If the client request is not successful, the processing logic ends. **If the client request is successful, however, a network address and associated information is stored in an address assignment table at block 408.** The network address is sent to the client at block 412. Process 400 then ends.

(Emphasis added).

Hall does not disclose “**updating a route table item** in a route table based on said route-related information,” as recited in claim 1. By contrast, Hall discloses **creating new address assignment table items not updating an existing item in the address assignment table.**

Kolli does not disclose the aforementioned limitation and the Examiner admits Kolli does not disclose the aforementioned limitation.

For at least the reasons described above, Kolli and Hall, alone and in combination (assuming *arguendo* that Hall could be combined with Kolli, which the Applicants do not admit), do not teach or fairly suggest each and every limitation of claim 1. Because Kolli and Hall do not teach or fairly suggest each and every limitation of claim 1, Kolli in view Hall does render claim 1 obvious. As a result the Examiner has not established a prima facie case of obviousness in rejecting claim 1. Claim 6 is patentable for reasons at least somewhat similar to those discussed above with regard to claim 1, noting that claim 6 should be interpreted solely based on the limitations set forth therein. Claims 2, 4, 5, 7, 9-10 and 15-16 are patentable at least by virtue of their dependency from an allowable base claim.

35 U.S.C. § 112

A Pre-Appeal Brief Conference is respectfully requested to review the rejection to claims 1-10 and 15-16 under 35 USC § 112, second paragraph.

In the Advisory Action dated October 31, 2011, the Examiner states “in order for the updating to be sequentially flowed next in the claimed process and the ‘predefined time using’ to include the process, the disclosed process step S14 of Fig. 2 must be included in the claimed process.” Applicants respectfully disagree.

**Limiting an applicant to the preferred materials** in the absence of limiting prior art **would not serve the constitutional purpose** of promoting the progress in the useful arts. Therefore, an enablement rejection based on the grounds that a disclosed critical limitation is missing from a claim should be made **only when the language of the specification makes it clear that the limitation is critical for the invention to function as intended.** Broad language in the disclosure, including the abstract, omitting an allegedly critical feature, tends to **rebut the argument of criticality**. See MPEP 2164.08(c).

(Emphasis added.)

Step S14 of Fig. 2 is determining whether the remaining time of said route table item is shorter than said predefined using time. If the remaining time of said route table item is shorter than said predefined using time, in step S15 the remaining time of said route item is updated to the said predefined using time. Claim 1 recites “obtaining route-related information from said access response message; and updating a route table item in a route table based on said route-related information.” Clearly claim 1 requires the updating of a route table item is “based on said route-related information.” The determining step (S14) is not **critical for the invention to function** and the Examiner **cannot** require the Applicant to include this step.

Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

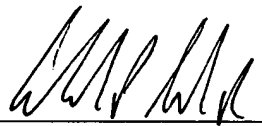
**CONCLUSION**

In view of the remarks, reconsideration of the objections and rejections and allowance of each of the pending claims in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Pre-Appeal Brief Review Board is respectfully requested to contact the undersigned at the telephone number. If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY & PIERCE, PLC

By  REG #62496  
For

Gary D. Yacura, Reg. No. 35,416

P.O. Box 8910  
Reston, VA 20195  
(703) 668-8000

GDY/EPS:cfc

1316677



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AF(12) 5

**TRANSMITTAL  
FORM**

(to be used for all correspondence after initial filing)

Application Number	12/310,660
Filing Date	May 29, 2009
Inventor(s)	Qin YIN et al.
Group Art Unit	2474
Examiner Name	Frank Duong
Attorney Docket Number	29250H-000013/US

**ENCLOSURES (check all that apply)**☒ Fee Transmittal Form☒ Fee Attached☐ Amendment☐ After Final☐ Affidavits/declaration(s)☒ Extension of Time Request☐ Express Abandonment Request☐ Information Disclosure Statement☐ Certified Copy of Priority Document(s)☐ Response to Missing Parts/Incomplete Application☐ Response to Missing Parts under 37 CFR 1.52 or 1.53☐ Assignment Papers  
(for an Application)☐ Letter to the Official Draftsperson and  
\_\_\_\_\_ Sheets of Formal Drawing(s)☐ Licensing-related Papers☐ Petition☐ Petition to Convert to a  
Provisional Application☐ Power of Attorney, Revocation  
Change of Correspondence Address☐ Terminal Disclaimer☐ Request for Refund☐ CD, Number of CD(s) \_\_\_\_\_☐ After Allowance Communication to  
Group☐ LETTER SUBMITTING APPEAL  
BRIEF AND APPEAL BRIEF (w/clean  
version of pending claims)☒ Appeal Communication to Group  
(Notice of Appeal, Brief, Reply Brief)☐ Proprietary Information☐ Status Letter☒ Other Enclosure(s)  
(please identify below):

- Pre-Appeal Brief Request  
for Review

- Reasons for Pre-Appeal  
Brief Conference


Remarks

**MAIL STOP: AF****SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**Firm  
or  
Individual name

Harness, Dickey &amp; Pierce, P.L.C.

Attorney Name  
Gary D. YacuraReg. No.  
35,416

Signature

 256 262496 For

Date

November 21, 2011 (Monday)

1316618



# FEE TRANSMITTAL for FY 2012

Effective 2/8/2006. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 770

## Complete if Known

Application Number 12/310,660  
Filing Date May 29, 2009  
First Named Inventor Qin YIN et al.  
Examiner Name Frank Duong  
Art Unit 2474  
Attorney Docket No. 29250H-000013/US

## METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number 08-0750

Deposit Account Name Harness, Dickey & Pierce, P.L.C.

The Director is authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☒ Credit any overpayments  
☒ Charge any additional fee(s) during the pendency of this application  
☒ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

## FEE CALCULATION

### 1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1011	380	2011	190	Utility filing fee	
1012	250	2012	125	Design filing fee	
1013	250	2013	125	Plant filing fee	
1014	380	2014	190	Reissue filing fee	
1005	250	2005	125	Provisional filing fee	

SUBTOTAL (1)

(\$) 0

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

	Total Claims	Extra Claims	Fee from below	Fee Paid
Total Claims	15	-20 ** = 0	X	= 0
Independent Claims	4	-4 ** = 0	X	= 0
Multiple Dependent				= 0

Large Entity		Small Entity		Fee Description
Fee Code	Fee (\$)	Fee Code	Fee (\$)	
1202	60	2202	30	Claims in excess of 20
1201	250	2201	125	Independent claims in excess of 3
1203	450	2203	225	Multiple dependent claim, if not paid
1204	250	2204	125	** Reissue independent claims over original patent
1205	60	2205	30	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2)

(\$) 0

\*\*or number previously paid, if greater; For Reissues, see above

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	150	2251	75	Extension for reply within first month	150
1252	560	2252	280	Extension for reply within second month	
1253	1,270	2253	635	Extension for reply within third month	
1254	1,980	2254	990	Extension for reply within fourth month	
1255	2,690	2255	1,345	Extension for reply within fifth month	
1401	620	2401	310	Notice of Appeal	620
1402	620	2402	310	Filing a brief in support of an appeal	
1403	1,240	2403	620	Request for oral hearing	
1452	620	2452	310	Petition to revive - unavoidable	
1453	1,860	2453	930	Petition to revive - unintentional	
1462	400	1462	400	Petition fee under 37 CFR 1.17(f)	
1463	200	1463	200	Petition fee under 37 CFR 1.17(g)	
1464	130	1464	130	Petition fee under 37 CFR 1.17(h)	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	810	2809	405	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	810	2810	405	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	930	2801	465	Request for Continued Examination (RCE)	

Other fee (specify) \_\_\_\_\_

\*Reduced by Basic Filing Fee Paid SUBTOTAL (3) (\$) 770

### 4. SEARCH/EXAMINATION FEES

1111	620	2111	310	Utility Search Fee	
1112	120	2112	60	Design Search Fee	
1113	380	2113	190	Plant Search Fee	
1114	620	2114	310	Reissue Search Fee	
1311	250	2311	125	Utility Examination Fee	
1312	160	2312	80	Design Examination Fee	
1313	200	2313	100	Plant Examination Fee	
1314	750	2314	375	Reissue Examination Fee	

SUBTOTAL (4) (\$) 0

## SUBMITTED BY

Complete (if applicable)

Name (Print/Type) Gary D. Yacura Registration No. (Attorney/Agent) 35,416 Telephone 703-668-8000  
Signature *[Signature]* Date November 21, 2011

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.



PTO/SB/31 (07-09)  
Approved for use through 07/31/2012. OMB 0651-0031  
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**NOTICE OF APPEAL FROM THE EXAMINER TO  
THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Docket Number (Optional)

29250H-000013/US

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on \_\_\_\_\_

Signature \_\_\_\_\_

Typed or printed  
name \_\_\_\_\_In re Application of  
Qin YIN et al.Application Number  
12/310,660Filed  
05/29/2009

For METHOD AND APPARATUS FOR .....

Art Unit  
2474Examiner  
Frank Duong

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1))

\$ 620.00

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is:

\$ \_\_\_\_\_

☒ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 08-0750

☐ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.  
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.  
(Form PTO/SB/96)

☒ attorney or agent of record.  
Registration number 35,416

☐ attorney or agent acting under 37 CFR 1.34.  
Registration number if acting under 37 CFR 1.34. \_\_\_\_\_

 266 D 62496  
for

Signature

Gary D. Yacura, Reg. No. 35,416

Typed or printed name

703-668-8000

Telephone number

November 21, 2011

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☐ \*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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11/22/2011 SZEWDIE1 00000012 12310660

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620.00 OP





PTO/SB/22 (09-11)

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Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)</b>		Docket Number (Optional) 29250H-000013/US																									
Application Number 12/310,660		Filed 05/29/2009																									
For <b>METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA ....</b>																											
Art Unit 2474		Examiner Frank Duong																									
<p>This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.</p> <p>The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):</p> <table style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 40%;"></th><th style="width: 15%; text-align: center;"><u>Fee</u></th><th style="width: 15%; text-align: center;"><u>Small Entity Fee</u></th><th style="width: 30%;"></th></tr></thead><tbody><tr><td><input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))</td><td style="text-align: center;">\$150</td><td style="text-align: center;">\$75</td><td style="text-align: right;">\$ 150.00</td></tr><tr><td><input type="checkbox"/> Two months (37 CFR 1.17(a)(2))</td><td style="text-align: center;">\$560</td><td style="text-align: center;">\$280</td><td style="text-align: right;">\$ _____</td></tr><tr><td><input type="checkbox"/> Three months (37 CFR 1.17(a)(3))</td><td style="text-align: center;">\$1270</td><td style="text-align: center;">\$635</td><td style="text-align: right;">\$ _____</td></tr><tr><td><input type="checkbox"/> Four months (37 CFR 1.17(a)(4))</td><td style="text-align: center;">\$1980</td><td style="text-align: center;">\$990</td><td style="text-align: right;">\$ _____</td></tr><tr><td><input type="checkbox"/> Five months (37 CFR 1.17(a)(5))</td><td style="text-align: center;">\$2690</td><td style="text-align: center;">\$1345</td><td style="text-align: right;">\$ _____</td></tr></tbody></table> <p><input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.</p> <p><input checked="" type="checkbox"/> A check in the amount of the fee is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number <u>08-0750</u>.</p> <p><b>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</b></p> <p>I am the <input type="checkbox"/> applicant/inventor.</p> <p><input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).</p> <p><input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>35,416</u></p> <p><input type="checkbox"/> attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"><div style="width: 60%; text-align: center;"><hr style="border: 0; border-top: 1px solid black; width: 100%;"/><p>Signature</p><p>Gary D. Yacura, Reg. No. 35,416</p><hr style="border: 0; border-top: 1px solid black; width: 100%;"/><p>Typed or printed name</p></div><div style="width: 35%; text-align: center;"><p>11/21/2011</p><hr style="border: 0; border-top: 1px solid black; width: 100%;"/><p>Date</p><p>703-668-8000</p><hr style="border: 0; border-top: 1px solid black; width: 100%;"/><p>Telephone Number</p></div></div> <p><input type="checkbox"/> Total of _____ forms are submitted.</p>					<u>Fee</u>	<u>Small Entity Fee</u>		<input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$150	\$75	\$ 150.00	<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$560	\$280	\$ _____	<input type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1270	\$635	\$ _____	<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$1980	\$990	\$ _____	<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2690	\$1345	\$ _____
	<u>Fee</u>	<u>Small Entity Fee</u>																									
<input checked="" type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$150	\$75	\$ 150.00																								
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$560	\$280	\$ _____																								
<input type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1270	\$635	\$ _____																								
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$1980	\$990	\$ _____																								
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2690	\$1345	\$ _____																								

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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11/22/2011 SZEWDIE1 00000012 12310660

02 FC:1251

150.00 OP



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
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 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

30594	7590	01/18/2012
HARNESS, DICKEY & PIERCE, P.L.C.		
P.O. BOX 8910		
RESTON, VA 20195		

EXAMINER	
DUONG, FRANK	

ART UNIT	PAPER NUMBER
2474	

MAIL DATE	DELIVERY MODE
01/18/2012	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Notice of Panel Decision from Pre-Appeal Brief Review</b>	Application/Control No.	Applicant(s)/Patent under Reexamination	
	12/310,660	YIN ET AL.	
	FRANK DUONG	Art Unit	
		2474	

This is in response to the Pre-Appeal Brief Request for Review filed 21 November 2011.

1. ☐ **Improper Request** – The Request is improper and a conference will not be held for the following reason(s):

- ☐ The Notice of Appeal has not been filed concurrent with the Pre-Appeal Brief Request.
- ☐ The request does not include reasons why a review is appropriate.
- ☐ A proposed amendment is included with the Pre-Appeal Brief request.
- ☐ Other: .

The time period for filing a response continues to run from the receipt date of the Notice of Appeal or from the mail date of the last Office communication, if no Notice of Appeal has been received.

2. ☐ **Proceed to Board of Patent Appeals and Interferences** – A Pre-Appeal Brief conference has been held. The application remains under appeal because there is at least one actual issue for appeal. Applicant is required to submit an appeal brief in accordance with 37 CFR 41.37. The time period for filing an appeal brief will be reset to be one month from mailing this decision, or the balance of the two-month time period running from the receipt of the notice of appeal, whichever is greater. Further, the time period for filing of the appeal brief is extendible under 37 CFR 1.136 based upon the mail date of this decision or the receipt date of the notice of appeal, as applicable.

☐ The panel has determined the status of the claim(s) is as follows:

Claim(s) allowed: \_\_\_\_\_.

Claim(s) objected to: \_\_\_\_\_.

Claim(s) rejected: \_\_\_\_\_.

Claim(s) withdrawn from consideration: \_\_\_\_\_.

3. ☐ **Allowable application** – A conference has been held. The rejection is withdrawn and a Notice of Allowance will be mailed. Prosecution on the merits remains closed. No further action is required by applicant at this time.

4. ☒ **Reopen Prosecution** – A conference has been held. The rejection is withdrawn and a new Office action will be mailed. No further action is required by applicant at this time.

All participants:

(1) FRANK DUONG.

(3)\_\_\_\_\_.

(2) Chi Pham.

(4)\_\_\_\_\_.

/Frank Duong/  
Primary Examiner, Art Unit 2474

/Chi H Pham/  
Supervisory Patent Examiner, Art  
Unit 2471



## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

30594	7590	03/26/2012
HARNESS, DICKEY & PIERCE, P.L.C.		
P.O. BOX 8910		
RESTON, VA 20195		

EXAMINER	
DUONG, FRANK	

ART UNIT	PAPER NUMBER
2474	

MAIL DATE	DELIVERY MODE
03/26/2012	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

12/310,660

**Applicant(s)**

YIN ET AL.

**Examiner**

FRANK DUONG

**Art Unit**

2474

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 November 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 1-11, 13 and 15-17 is/are pending in the application.
- 5a) Of the above claim(s) 11, 13 and 17 is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1 and 6 is/are rejected.
- 8) ☒ Claim(s) 2-5 and 7-10 is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.   | 6) <input type="checkbox"/> Other: ____.                          |

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 2

### DETAILED ACTION

1. This Office Action is a response to communications dated 11/21/11 and 01/18/12. Claims 1-11, 13 and 15-17 are still pending in the application. Claims 11, 13 and 17 are withdrawn from further consideration based on non-elected claims as stated in the Office Action dated 07/19/21. Thus, claims 1-10 and 15-16 are examined on the merits.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 6 and 15-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Radia et al (US 5,922,049) (hereinafter “Radia”).

Regarding **claims 1 and 15-16**, in accordance with Radia reference entirety, Radia teaches a method (*Fig. 4 and its corresponding description begins at col. 5, line 27 and thereafter*), in an access device (106) of the communication network (*Fig. 1 and its corresponding description begins at col. 3, line 66 and thereafter*), for managing route information, comprising:

receiving an access response message (Fig. 3) from a server (110) (*Fig. 4; steps 402-404 and col. 5, lines 31-33 and thereafter, it is disclosed router 106 receives a DHCPACK message*);

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 3

obtaining route-related information from said access response message (DHCPACK) *(Fig. 4; step 406 and col. 5, lines 39-41 and thereafter, it is disclosed router process 214 extracted the IP address included in the yiaddr field 304 of the DHCPACK message); and*

updating a route table item in a route table based on said route-related information *(Fig. 4; steps 410-412 and col. 5, lines 45-67 and thereafter, it is disclosed router process 214 updates the route table 216 to include the new route).*

Regarding **claim 6**, the claim calls for an apparatus having limitation mirrored method steps of claim 1. Thus, it is anticipated by the same rationales applied to claim 1 as discussed above.

#### ***Allowable Subject Matter***

3. Claims 2-5 and 7-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, considered individually or in combination, appears to fail to further limit base claims 1 and 6 with additional limitations structurally and functionally interconnected with other limitations in a manner as recited in claims 2-5 and 7-10.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 4

***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK DUONG whose telephone number is (571)272-3164. The examiner can normally be reached on 7:00AM-3:30PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi H. Pham can be reached on 571-272-3179. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Frank Duong/  
Primary Examiner, Art Unit 2474  
March 18, 2012



<b>Notice of References Cited</b>	Application/Control No. 12/310,660		Applicant(s)/Patent Under Reexamination YIN ET AL.	
	Examiner FRANK DUONG		Art Unit 2474	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,922,049	07-1999	Radia et al.	709/220
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	20879	VLAN or (virtual near3 ((local adj area) or LAN))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:39
L2	2011	1 and (DHCP or (dynamic adj host adj configuration))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:39
L3	698	2 and (arp or (address adj resolution))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:39
L4	660	3 and ((forward\$4 or switch\$4) and (gateway or rout\$4))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:39
L5	650	4 and ((IP or "internet protocol" or (destination and source)) same address)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:39
L6	163	5 and 370/351-357,389,392,395.5-395.54,464-467.ccls.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:39
L7	84	6 and (rout\$4 near3 table)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 16:40

**3/ 18/ 2012 4:40:06 PM**




## UNITED STATES PATENT AND TRADEMARK OFFICE

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## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA;						
<b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007						
<b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006						
<b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> CHINA	<b>SHEETS DRAWINGS</b> 6	<b>TOTAL CLAIMS</b> 17	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b> Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b> 1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

<b>Search Notes</b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  FRANK DUONG	<b>Art Unit</b>  2474

### SEARCHED

Class	Subclass	Date	Examiner
370	351-357,389,392,395.5-395.54,464-467	3/18/2012	FD

### SEARCH NOTES

Search Notes	Date	Examiner
Updated EAST Search (see printout)	3/18/2012	FD
Updated Inventorship Search (see printout)	3/18/2012	FD
Updated IEEE/Internet Search	3/18/2012	FD
Updated class 370/351-357,389,392,395.5-395.54,464-467 (text search only-see printout)	3/18/2012	FD

### INTERFERENCE SEARCH

Class	Subclass	Date	Examiner


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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	5	Yin-Qin.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 13:42
L2	2	Miu-Yingzhong.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 13:42
L3	70	Zhu-Jianhua.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2012/03/18 13:42

3/ 18/ 2012 1:43:18 PM

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  Frank Duong	<b>Art Unit</b>  2474

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input checked="" type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>						<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>	
CLAIM		DATE									
Final	Original	10/18/2010	03/28/2011	07/17/2011	03/18/2012						
	1	✓	÷	✓	✓						
	2	✓	÷	✓	○						
	3	○	÷	○	○						
	4	✓	÷	✓	○						
	5	✓	÷	✓	○						
	6	✓	÷	✓	✓						
	7	✓	÷	✓	○						
	8	○	÷	○	○						
	9	✓	÷	✓	○						
	10	✓	÷	✓	○						
	11	✓	÷	N	N						
	12	✓	-	-	-						
	13	✓	÷	N	N						
	14	✓	-	-	-						
	15	✓	÷	✓	✓						
	16	✓	÷	✓	✓						
	17	✓	÷	N	-						

DW

**PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660                      Group Art Unit: 2474  
 Filing Date: May 29, 2009                      Examiner: Frank Duong  
 Applicant: Qin YIN et al.  
 Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
 INFORMATION AND FORWARDING DATA IN ACCESS  
 DEVICES  
 Attorney Docket: 29250H-000013/US

Customer Service Window  
 Randolph Building  
 401 Dulany Street  
 Alexandria, VA 22314  
**Mail Stop Amendment**

June 26, 2012

**RESPONSE UNDER 37 C.F.R. §1.111**

Sir or Madam:

In response to the non-final Office Action mailed March 26, 2012, the following remarks are respectfully submitted in connection with the above-identified application.

**Listing of the Claims** begin on page 2 of this Response.

**Remarks** begin on page 7 of this Response.

	<b>Claims remaining after Response</b>		<b>Highest number previously paid for</b>		<b>Present extra</b>
<b>Total</b>	17	-	20	=	0
<b>Independent</b>	4	-	4	=	0

**LISTING OF THE CLAIMS**

The following is a complete listing of the revised claims with a status identifier in parenthesis.

**LISTING OF CLAIMS**

1. (Previously Presented) A method, in an access device of the communication network, for managing route information, comprising:
  - receiving an access response message from a server;
  - obtaining route-related information from said access response message; and
  - updating a route table item in a route table based on said route-related information.
2. (Previously Presented) The method according to claim 1, wherein said obtaining includes obtaining a predefined using time from said access response message, said predefined using time indicates a using time of said route; and
  - wherein the updating is further based on said predefined using time.
3. (Previously Presented) The method according to claim 2, further comprising:
  - determining whether the route table item corresponding to said route-related information exists in said route table;
  - updating a remaining time of the route table item if the determining determines that the route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time; and
  - creating a route table item corresponding to the route-related information if the



determining determines that the route table item corresponding to said route-related information does not exist in the route table.

4. (Previously Presented) The method according to claim 1, further comprising:

obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message; wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. (Previously Presented) The method according to claim 1, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. (Previously Presented) A route management apparatus, in an access device of the communication network, for managing route information, comprising:

a receiver configured to receive an access response message from a server;

a first obtainer configured to obtain said route-related information from said access response message; and

a route maintainer configured to update a route table based on said route-related information.

7. (Previously Presented) The apparatus according to claim 6, wherein said obtainer is further configured to obtain a predefined using time from said access response message, said predefined using time indicates the using time of said router; and

said route maintainer is further configured to update said route table item further

based on said predefined using time.

8. (Previously Presented) The apparatus according to claim 6, wherein said route maintainer includes:

a first judger configured to judge whether the route table item corresponding to said route-related information exists in said route table;

a second judger configured to judge whether a remaining time of said route table item is shorter than said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table;

an updater configured to update the remaining time of said route table item to said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table and the second judger judges that the remaining time of said route table item is shorter than said predefined using time;

a creator configured to create the route table item corresponding to said route-related information if the first judger judges that no route table item corresponding to said route-related information exists in said route table.

9. (Previously Presented) The apparatus according to claim 6, further comprising:

a second obtainer configured to obtain correlated information of said route table item and a virtual local area network;

wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. (Previously Presented) The apparatus according to claim 6, wherein said access response message refers to a dynamic host configuration protocol, said predefined

using time refers to the lease time in said dynamic host configuration protocol response message.

11. (Withdrawn-Previously Presented) A method, in an access device of the communication network, for forwarding data, comprising:

receiving a packet from a user terminal, the packet including a source network address and a destination network address;

determining a gateway that has access to a destination network corresponding with the destination network address;

determining a forwarding port of the gateway based on comparing the destination network address to a route table; and

sending the packet to the gateway via the forwarding port.

12. (Cancelled).

13. (Withdrawn-Previously Presented) A forwarding apparatus, in an access device of the communication network, for forwarding data, comprising:

a receiver configured to receive a packet from a user terminal, the packet including a source network address and a destination network address;

a processor configured to determine a gateway that has access to a destination network corresponding with the destination network address, the processor further configured to a forwarding port of the gateway based on comparing the destination network address to a route table; and

a transmitter configured to transmit the packet to the gateway via the forwarding port.

14. (Cancelled).

15. (Original) An access device in the communication network, wherein said access device comprises a route management apparatus according to claim 6.

16. (Previously Presented) The device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

17. (Withdrawn-Previously Presented) The access device in the communication network, wherein said access device comprises the forwarding apparatus according to claim 13.

18. (New) The method according to claim 1, wherein said access device is a Layer 2 access device.

19. (New) The apparatus according to claim 6, wherein said access device is a Layer 2 access device.

**REMARKS**

Favorable reconsideration of this application, in light of the following remarks, is respectfully requested.

Claims 1-11, 13 and 15-19 are pending in this application, with new claims 18 and 19 being added by the present Amendment.

**Allowable Subject Matter**

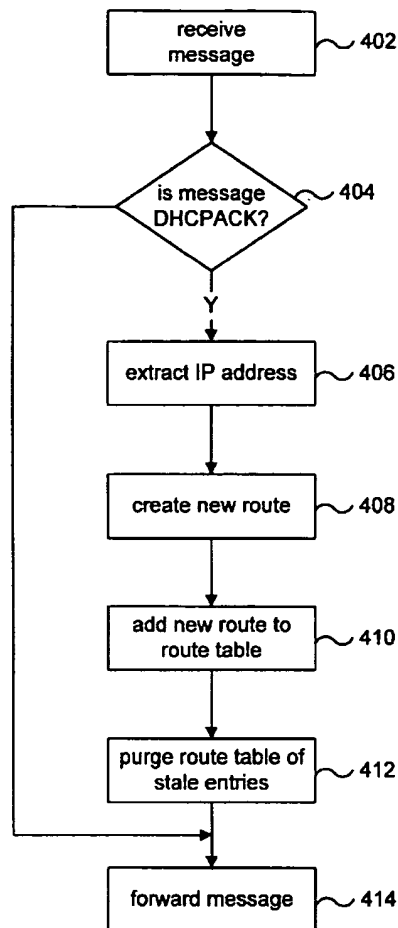
Applicants note with appreciation that the Examiner has deemed claims 2-5 and 7-10 as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicants choose not to amend the claims at this time at least for the reasons detailed below.

**Rejections under 35 U.S.C. § 102**

Claims 1, 6 and 15-16 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 5,922,049 to Radia et al. ("Radia"). Applicants respectfully traverse this rejection for the reasons detailed below.

The Examiner alleges that Radia discloses "updating a route table item in a route table based on said route-related information," as recited in claim 1. Applicants respectfully disagree. In making the aforementioned rejection, the Examiner relies on FIG. 4 (steps 410-414) and column 5, lines 45-67 of Radia.

FIG. 4 of Radia is reproduced below:



Column 5, lines 45-67 of Radia is reproduced below:

In step 410, the router process 214 uses the IP address extracted in step 406 **to create a route for the client system 102**. The route is a mapping that tells the router 106 that IP packets directed at the IP address allocated by the DHCP server 110 are to be forwarded to the client system 102. In step 410, the router process 214 **updates the route table 216 to include the new route**. Importantly, the route process 214 marks the new route to indicate that it is DHCP assigned. Thereafter, the route process 214 will only override this route if the router 106 receives another DHCPACK reassigning the same IP address extracted in step 406.

In step 412, which follows, the router process 214 **purges the route table 216 of invalid or stale entries**. For the purposes of the present invention, "stale" entries are previously learned routes included in the route table 216 that are **invalidated by the new route added by the router process 214 in step 410**. Thus, previously learned routes that associate the client system 102 with IP addresses that differ from the IP address allocated by the DHCP server 110 are removed from the route table 216. Additionally, previously learned routes that associate the IP address allocated by the

DHCP server 110 with client systems 102 other than the client system requesting the IP address are also removed from the route table 216. In this way, the IP address allocated by the DHCP server 110 for the client system 102 overrides previously learned routes. Importantly, routes that are statically configured in the router 106 are not removed. Thus, the present invention may be used where a network includes one or more statically assigned IP addresses.

Emphasis added.

Radia discloses adding new routes to a route table, purging stale routes and overriding routes with reassigned IP addresses. Figure 4 of Radia discloses this method. According to Radia, in step 406, the router process 214 extracts the IP address included in the yiaddr field 304 of the DHCPACK message. In step 408, the router process 214 uses the IP address extracted in step 406 to create a route for the client system 102. The route is a mapping that tells the router 106 that IP packets directed at the IP address allocated by the DHCP server 110 are to be forwarded to the client system 102. In step 410, the router process 214 updates the route table 216 to include the new route. The route process 214 marks the new route to indicate that it is DHCP assigned. Thereafter, the route process 214 will only override this route if the router 106 receives another DHCPACK reassigning the same IP address extracted in step 406.

Radia does not disclose “**updating a route table item** in a route table based on said route-related information,” as required by claim 1. By contrast, Radia creates a new route not update an existing route (or entry).

For at least the reasons described above, Radia does not teach or fairly suggest each and every limitation of claim 1. Because Radia does not teach or fairly suggest each and every limitation of claim 1, Radia does not anticipate or render claim 1 obvious. Claim 6 is patentable for reasons at least somewhat similar to those discussed above with regard to claim 1, noting that claim 6 should be interpreted

solely based on the limitations set forth therein. Claims 15 and 16 are patentable at least by virtue of their dependency from an allowable base claim.

The Applicants, therefore, respectfully request reconsideration and withdrawal of the rejection to claims 1, 6 and 15-16 under 35 U.S.C. § 102(b).

### **New Claims**

New claims 18 and 19 have been added in an effort to provide further protection for Applicants' invention, no new matter has been added. New claims 18 and 19 are allowable at least for reasons somewhat similar as those regarding claims 1 and 6 although each claim should be interpreted solely based upon the limitations set forth therein.

Further, Radia relates to client systems and routers that are Layer 3 clients. For example, in Radia the router learns IP addresses that are assigned by a DHCP server which is Layer 3 functionality. See, for example, column 2, lines 27-29 of Radia which states "IP addresses within networks are assigned by server systems using the Dynamic Host Configuration Protocol (DHCP) as is defined in Internet RFC 1541."



Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

**CONCLUSION**

In view of the above remarks, the Applicants respectfully submit that each of the pending objections and rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

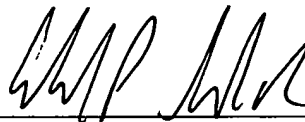
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned, at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKY, & PIERCE, P.L.C.

By



Gary D. Yacura, Reg. No. 35,416  
Edward P. Smith, Reg. No. 62,496

P.O. Box 8910  
Reston, Virginia 20195  
(703) 668-8000

GDY/EPS

1503838.1

PTO/SB/06 (07-06)

Approved for use through 1/31/2007. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/310,660</b>		Filing Date <b>05/29/2009</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$	=	OR	X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	06/25/2012	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0	X \$	=	OR	X \$60=	0	
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X \$	=	OR	X \$250=	0	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0	
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$	=	OR	X \$	=	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$	=	OR	X \$	=	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:  
/AMANDA FORD/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



## UNITED STATES PATENT AND TRADEMARK OFFICE

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 Alexandria, Virginia 22313-1450  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

30594 7590 09/11/2012  
 HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

EXAMINER
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DUONG, FRANK

ART UNIT	PAPER NUMBER
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2474

MAIL DATE	DELIVERY MODE
-----------	---------------

09/11/2012

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

12/310,660

**Applicant(s)**

YIN ET AL.

**Examiner**

FRANK DUONG

**Art Unit**

2474

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 June 2012.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 1-11, 13 and 15-19 is/are pending in the application.
- 5a) Of the above claim(s) 11, 13 and 17 is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1, 5, 15, 16, 18 and 19 is/are rejected.
- 8) ☒ Claim(s) 2-5 and 7-10 is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 2

### DETAILED ACTION

1. This Office Action is a response to communications dated 06/25/2012. Previously prosecuted claims 1-10, 15-16, withdrawn-previously presented claims 11, 13 and 17, and newly added claims 18-19 are still pending in the application. In a response to this Office Action, the applicants should further amend the claims and cancel the withdrawn claims 11, 13 and 17 to place the instant application in a favorable condition for allowance for the following rationales.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 6, 15-16 and 18-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Radia et al (US 5,922,049) (hereinafter “Radia”).

Regarding **claims 1, 15-16 and 18-19**, in accordance with Radia reference entirety, Radia teaches a method (*Fig. 4 and its corresponding description begins at col. 5, line 27 and thereafter*), in an access device (106) of the communication network (*Fig. 1 and its corresponding description begins at col. 3, line 66 and thereafter*), for managing route information, comprising:

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 3

receiving an access response message (Fig. 3) from a server (110) (*Fig. 4; steps 402-404 and col. 5, lines 31-33 and thereafter, it is disclosed router 106 receives a DHCPACK message*);

obtaining route-related information from said access response message (DHCPACK) (*Fig. 4; step 406 and col. 5, lines 39-41 and thereafter, it is disclosed router process 214 extracted the IP address included in the yiaddr field 304 of the DHCPACK message*); and

updating a route table item in a route table based on said route-related information (*Fig. 4; steps 410-412 and col. 5, lines 45-67 and thereafter, it is disclosed router process 214 updates the route table 216 to include the new route*).

Regarding **claim 6**, the claim calls for an apparatus having limitation mirrored method steps of claim 1. Thus, it is anticipated by the same rationales applied to claim 1 as discussed above.

### ***Allowable Subject Matter***

3. Claims 2-5 and 7-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, considered individually or in combination, appears to fail to further limit base claims 1 and 6 with additional limitations structurally and functionally interconnected with other limitations in a manner as recited in claims 2-5 and 7-10.

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 4

***Response to Arguments***

5. Applicant's arguments filed 06/25/12 have been fully considered but they are not persuasive.

In the remarks of the outstanding response filed on 06/25/2012, the applicants copy the portion of the applied art of Radia, analyze it and come to an argument that "*By contrast, Radia creates a new route not update an existing route (or entry).*"

In response examiner respectfully disagrees and asserts the interpretation of Radia's teaching to read on the claimed limitation in a present condition is just. Applicants are reminded that it is well settled that, during examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification. *In re Hyatt*, 211 F.3d 1367,1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). USPTO personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023,1027-28 (Fed. Cir. 1997). The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.

It is undeniable that Radia does clearly teach "**updates the route table 216 to include the new route**" as recited in column 5, lines 45-67 as produced by the Applicants in the remarks of the outstanding response. The disputed claimed limitation merely calls for "*updating a route table item in a route table based on said route-related information.*" It neither specifically mention nor it recites "update an existing route" as argued by the Applicants. Given broadest reasonable interpretation, Radia's teaching of

Application/Control Number: 12/310,660

Page 5

Art Unit: 2474

updating the route table 216 to include new route (entry) clearly reads on the claimed limitation in the present condition. Perhaps the applicants refer to certain features that are disclosed in the present application but not recited in the reject claims in making the contention that the Radia reference fails to show certain feature of applicant's invention. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In a response to this Office Action, the Applicants should further amend the claims by incorporate the limitations in objected dependent claims to place the instant application in a favorable condition for allowance.

Examiner believes an earnest attempt has been made in addressing all of the applicants' arguments. Due to the response fails to place the instant application in a favorable condition for allowance, the rejection is maintained.

### ***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any



Application/Control Number: 12/310,660

Page 6

Art Unit: 2474


extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK DUONG whose telephone number is (571)272-3164. The examiner can normally be reached on 7:00AM-3:30PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Thier can be reached on 571-272-2832. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Frank Duong/  
Primary Examiner, Art Unit 2474  
September 4, 2012

<b>Search Notes</b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  FRANK DUONG	<b>Art Unit</b>  2474

### SEARCHED

Class	Subclass	Date	Examiner
370	351-357,389,392,395.5-395.54,464-467	9/4/2012	FD


### SEARCH NOTES

Search Notes	Date	Examiner
Updated EAST Search (see printout)	9/4/2012	FD
Updated Inventorship Search (see printout)	9/4/2012	FD
Updated IEEE/Internet Search	9/4/2012	FD
Updated class 370/351-357,389,392,395.5-395.54,464-467 (text search only-see printout)	9/4/2012	FD

### INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

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<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  Frank Duong	<b>Art Unit</b>  2474

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant							<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
CLAIM		DATE										
Final	Original	10/18/2010	03/28/2011	07/17/2011	03/18/2012	09/04/2012						
	1	✓	÷	✓	✓	✓						
	2	✓	÷	✓	○	○						
	3	○	÷	○	○	○						
	4	✓	÷	✓	○	○						
	5	✓	÷	✓	○	○						
	6	✓	÷	✓	✓	✓						
	7	✓	÷	✓	○	○						
	8	○	÷	○	○	○						
	9	✓	÷	✓	○	○						
	10	✓	÷	✓	○	○						
	11	✓	÷	N	N	N						
	12	✓	-	-	-	-						
	13	✓	÷	N	N	N						
	14	✓	-	-	-	-						
	15	✓	÷	✓	✓	✓						
	16	✓	÷	✓	✓	✓						
	17	✓	÷	N	-	N						
	18					✓						
	19					✓						



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

30594	7590	01/10/2013
HARNESS, DICKEY & PIERCE, P.L.C.		
P.O. BOX 8910		
RESTON, VA 20195		

EXAMINER	
DUONG, FRANK	

ART UNIT	PAPER NUMBER
2474	

MAIL DATE	DELIVERY MODE
01/10/2013	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b><i>Applicant-Initiated Interview Summary</i></b>	<b>Application No.</b> 12/310,660	<b>Applicant(s)</b> YIN ET AL.	
	<b>Examiner</b> FRANK DUONG	<b>Art Unit</b> 2474	

All participants (applicant, applicant's representative, PTO personnel):

(1) FRANK DUONG. (3) Michelle Banihashemi.

(2) Babak Monajemi (Reg. No. 68,060). (4) \_\_\_\_.

Date of Interview: 27 December 2012.

Type: ☒ Telephonic ☐ Video Conference  
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed ☐101 ☐112 ☒102 ☐103 ☐Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1.

Identification of prior art discussed: Radia et al (US 5,922,049).

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Applicants' representatives, Babak Manajemi and Michelle Banishemi, call the examiner up at a predetermined time to discuss the claims, specifically claim 1. The representatives disagree with the examiner's interpretation of radia's teaching to read on the claimed limitation of "updating a route table item in a route table based on said route-related information" and would like the examiner to explain his position. Examiner advises the representative to read block S16 of the drawings of the application, which discloses that "creating a route table item corresponding to said route-related information," and block S15, which discloses "updating the remaining time of said route table item to said predefined using time." Examiner states his position that the disputed limitation of "updating a route table item in a route table based on said route-related information" clearly gears toward block S16 instead of bloc S15 as argued. Thus, the Radia's teaching of Figure 4 clearly anticipated such disputed limitation in a manner as claimed. Examiner advises the representatives to further amend claim 1 to incorporate limitations from the dependent claim 2 to place the instant application in a favorable condition for allowance. The representatives will have to consult with the clients. Upon receiving a response, everything will be considered in view of this interview. No agreement was reached.

**Applicant recordation instructions:** The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Frank Duong/ Primary Examiner, Art Unit 2474	
--	--

**Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record**

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

**Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews**  
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

**Examiner to Check for Accuracy**

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.



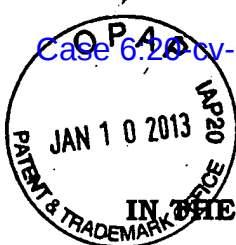
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## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA; <b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007 <b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b>  CHINA	<b>SHEETS DRAWINGS</b>  6	<b>TOTAL CLAIMS</b>  17	<b>INDEPENDENT CLAIMS</b>  4
<b>ADDRESS</b>  HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b>  Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b>  1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		



PATENT

AF★  
JAN 10 2013

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 12/310,660                      Group Art Unit: 2474

Filing Date: May 29, 2009                      Examiner: Frank Duong

Applicant: Qin YIN et al.

Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES

Attorney Docket: 29250H-000013/US

Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
**Mail Stop AF**

January 10, 2013

**AMENDMENT UNDER 37 CFR 1.116**

Sir:

In response to the Final Office Action mailed September 11, 2012, the due date being extended by a one month extension of time to January 11, 2013, the following amendments and remarks are respectfully submitted in connection with the above-identified application.

**Amendments to the Claims** begin on page 2 of this Amendment.

**Remarks** begin on page 7 of this Amendment.

	Claims remaining after Response		Highest number previously paid for		Present extra
<b>Total</b>	12	-	20	=	0
<b>Independent</b>	4	-	4	=	0

01/11/2013 SHOHANNE 00000003 12310660

01 FC:1251

150.00 OP



**AMENDMENTS TO THE CLAIMS**

The following is a complete, marked up listing of revised claims with a status identifier in parentheses, underlined text indicating insertions, and strikethrough and/or double-bracketed text indicating deletions.

1. (Currently Amended) A method, in an access device of the communication network, for managing route information, comprising:

receiving an access response message from a server;

obtaining route-related information and a predefined using time from said access response message, said predefined using time indicates a using time of said route; and

updating a route table item in a route table based on said route-related information and said predefined using time.

2. (Canceled).

3. (Currently Amended) The method according to claim 1 ~~claim 2~~, further comprising:

determining whether the route table item corresponding to said route-related information exists in said route table;

updating a remaining time of the route table item if the determining determines that the route table item corresponding to said route-related information exists in said route table and the remaining time of said route table item is shorter than said predefined using time; and

creating a route table item corresponding to the route-related information if the

determining determines that the route table item corresponding to said route-related information does not exist in the route table.

4. (Previously Presented) The method according to claim 1, further comprising:

obtaining correlated information of said route table item and a virtual local area network from an address resolution protocol message or an access response message; wherein said virtual local area network configuration is employed between said access device and each marginal router connected with said access device.

5. (Previously Presented) The method according to claim 1, wherein said access response message refers to a dynamic host configuration protocol response message, said predefined using time refers to the lease time in said dynamic host configuration protocol response message.

6. (Currently Amended) A route management apparatus, in an access device of the communication network, for managing route information, comprising:

a receiver configured to receive an access response message from a server;

a first obtainer configured to obtain ~~said~~ route-related information and a predefined using time from said access response message, said predefined using time indicating the using time of said route; and

a route maintainer configured to update a route table based on said route-related information and said predefined using time.

7. (Canceled).

8. (Previously Presented) The apparatus according to claim 6, wherein said route maintainer includes:

a first judger configured to judge whether the route table item corresponding to said route-related information exists in said route table;

a second judger configured to judge whether a remaining time of said route table item is shorter than said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table;

an updater configured to update the remaining time of said route table item to said predefined using time if the first judger judges that the route table item corresponding to said route-related information exists in said route table and the second judger judges that the remaining time of said route table item is shorter than said predefined using time;

a creator configured to create the route table item corresponding to said route-related information if the first judger judges that no route table item corresponding to said route-related information exists in said route table.

9. (Previously Presented) The apparatus according to claim 6, further comprising:

a second obtainer configured to obtain correlated information of said route table item and a virtual local area network;

wherein, said virtual local area network configuration is employed between said access device and each marginal routers connected with said access device.

10. (Previously Presented) The apparatus according to claim 6, wherein said access response message refers to a dynamic host configuration protocol, said predefined using time refers to the lease time in said dynamic host configuration protocol

response message.

11-14. (Cancelled).

15. (Original) An access device in the communication network, wherein said access device comprises a route management apparatus according to claim 6.

16. (Previously Presented) The device according to claim 15, wherein said access device is a digital subscriber line-access multiplexer.

17. (Canceled).

18. (Previously Presented) The method according to claim 1, wherein said access device is a Layer 2 access device.

19. (Previously Presented) The apparatus according to claim 6, wherein said access device is a Layer 2 access device.

**<End of Claims Listing>**

**REMARKS**

Claims 1, 3-6, 8-10, 15-16 and 18-19 are pending in this application. Claims 1 and 6 are independent claims.

**Allowable Subject Matter**

Claims 2-5 and 7-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants have amended independent claim 1 to include the allowable features of claim 2, thereby cancelling claim 2. Further, Applicants have amended independent claim 6 to incorporate the allowable features of claim 7, thereby cancelling claim 7. Claims 3-5, 8-10, 15-16 and 18-19 depend from allowable claims 1 and 6. Therefore, allowance of claims 1, 3-6, 8-10, 15-16 and 18-19 is respectfully requested.

**Rejections under 35 U.S.C. § 102**

In light of the incorporation of the subject matter of allowable dependent claims 2 and 7 into independent claims 1 and 6, Applicants respectfully submit that the rejections of claims 1, 6, 15-16 and 18-19 are rendered moot.

**CONCLUSION**

In view of the above amendments and remarks, reconsideration of the objections and rejections and allowance of each of the pending claims in connection with the present application is earnestly solicited.

Pursuant to 37 C.F.R. §1.17 and 1.136(a), Applicant(s) hereby petition(s) for a one (1) month extension of time for filing a reply to the outstanding Office Action and submit the required \$150.00 extension fee herewith.

Should there be any outstanding matters that need to be resolved in the present application the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. §1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKY, & PIERCE, P.L.C.

By: \_\_\_\_\_

Gary D. Yacura, Reg. No. 35,416

P.O. Box 8910  
Reston, Virginia 20195  
(703) 668-8000

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*gy*

1650658.1

**REMARKS**

Claims 1, 3-6, 8-10, 15-16 and 18-19 are pending in this application. Claims 1 and 6 are independent claims.

**Allowable Subject Matter**

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In light of the incorporation of the subject matter of allowable dependent claims 2 and 7 into independent claims 1 and 6, Applicants respectfully submit that the rejections of claims 1, 6, 15-16 and 18-19 are rendered moot.

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Respectfully submitted,

HARNESS, DICKY, & PIERCE, P.L.C.

By: \_\_\_\_\_

Gary D. Yacura, Reg. No. 35,416

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GDY/CXM:gew

*gy*

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>12/310,660</b>		Filing Date <b>05/29/2009</b>		<input type="checkbox"/> To be Mailed	
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$	=		X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	01/10/2013	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 12	Minus	** 20	=	X \$	=	OR	X \$	=
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 4	=	X \$	=	OR	X \$	=
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE			TOTAL ADD'L FEE		
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	Total (37 CFR 1.16(i))	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$	=	OR	X \$	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$	=	OR	X \$	=
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE			TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:  
/PEGGY YARBOROUGH/

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30594 7590 01/22/2013  
 HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

EXAMINER

DUONG, FRANK

ART UNIT

PAPER NUMBER

2474

DATE MAILED: 01/22/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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12/310,660

05/29/2009

Qin Yin

29250H-000013/US

2600

TITLE OF INVENTION: METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1770	\$300	\$0	\$2070	04/22/2013

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

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If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

12/310,660 05/29/2009 Qin Yin 29250H-000013/US 2600

TITLE OF INVENTION: METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1770	\$300	\$0	\$2070	04/22/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
DUONG, FRANK	2474	370-392000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

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- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_  
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_  
3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

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☐ Publication Fee (No small entity discount permitted)  
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4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_

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30594	7590	01/22/2013
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HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

EXAMINER
DUONG, FRANK

ART UNIT	PAPER NUMBER
2474	

DATE MAILED: 01/22/2013

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 95 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 95 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	12/310,660	YIN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	FRANK DUONG	2474	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to communications dated 1/10/2013.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1, 2-6, 8-10, 15-16 and 18-19 (now 1-12, accordingly). As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
  1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Examiner's Amendment/Comment                             |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date ____     | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 7. <input type="checkbox"/> Other ____.  |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date ____.                      |  |

/Frank Duong/  
Primary Examiner, Art Unit 2474

Application/Control Number: 12/310,660  
Art Unit: 2474

Page 2

### **DETAILED ACTION**

1. This Office Action is a response to communications dated 01/10/2013. Claims 1, 3-6, 8-10, 15-16 and 18-19 are still pending in the application.

### ***Allowable Subject Matter***

2. Claims 1, 3-6, 8-10, 15-16 and 18-19 are allowed.

3. The following is an examiner's statement of reasons for allowance: The prior art of record, considered individually or in combination, appears to fail to fairly show or suggest a claimed invention comprising, among other limitations, novel and unobvious limitations of "*obtaining route-related information and a predefined using time from said access response message, said predetermined using time indicates a using time of said route; and updating a route table item in a route table based on said route-related information and said predetermined using time,*" structurally and functionally interconnected with other limitations in a manner as recited in the claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK DUONG whose telephone number is (571)272-3164. The examiner can normally be reached on 7:00AM-3:30PM, Monday-Friday.

Application/Control Number: 12/310,660

Page 3


Art Unit: 2474

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Thier can be reached on 571-272-2832. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Frank Duong/  
Primary Examiner, Art Unit 2474  
January 17, 2013



<b>Search Notes</b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  FRANK DUONG	<b>Art Unit</b>  2474

### SEARCHED

Class	Subclass	Date	Examiner
370	351-357,389,392,395.5-395.54,464-467	1/17/2013	FD

### SEARCH NOTES

Search Notes	Date	Examiner
Updated EAST Search (see printout)	1/17/2013	FD
Updated Inventorship Search (see printout)	1/17/2013	FD
Updated IEEE/Internet Search	1/17/2013	FD
Updated class 370/351-357,389,392,395.5-395.54,464-467 (text search only-see printout)	1/17/2013	FD

### INTERFERENCE SEARCH


Class	Subclass	Date	Examiner
	Interference Search (see printout)	1/17/2013	FD

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**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	24037	VLAN or (virtual near3 ((local adj area) or LAN))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:19
L2	2340	1 and (DHCP or (dyanmic adj host adj configuration))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:19
L3	801	2 and (arp or (address adj resolution))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:19
L4	754	3 and ((forward\$4 or switch\$4) and (gateway or rout\$4))	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:20
L5	743	4 and ((IP or "internet protocol" or (destination and source)) same address)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:20
L6	182	5 and 370/351-357,389,392,395.5-395.54,464-467.ccls.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:20
L7	97	6 and (rout\$4 near3 table)	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:20

**1 / 17 / 2013 3:20:39 PM**

<b>Issue Classification</b> 	<b>Application/Control No.</b> 12310660	<b>Applicant(s)/Patent Under Reexamination</b> YIN ET AL.
	<b>Examiner</b> FRANK DUONG	<b>Art Unit</b> 2474

ORIGINAL						INTERNATIONAL CLASSIFICATION												
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED							
370			392			H	0	4	L	12 / 56 (2006.01.01)								
CROSS REFERENCE(S)																		
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																	

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		17												
	2	2	18												
3	3	7	19												
4	4														
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	11														
	12														
	13														
	14														
11	15														
12	16														

NONE		Total Claims Allowed: 12	
(Assistant Examiner)	(Date)		
/FRANK DUONG/ Primary Examiner.Art Unit 2474	1/17/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3a



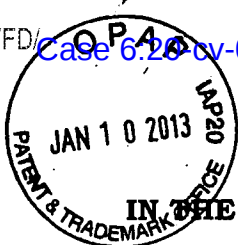
## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

## BIB DATA SHEET

CONFIRMATION NO. 2600

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
12/310,660	05/29/2009	370	2474	29250H-000013/US		
<b>RULE</b>						
<b>APPLICANTS</b> Qin Yin, Shanghai, CHINA; Yingzhong Miu, Shanghai, CHINA; Jianhua Zhu, Shanghai, CHINA; Yifeng Yao, Shanghai, CHINA; <b>** CONTINUING DATA *****</b> This application is a 371 of PCT/CN2007/002449 08/14/2007 <b>** FOREIGN APPLICATIONS *****</b> CHINA 200610030926.0 09/07/2006 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 09/18/2009						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/FRANK DUONG/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> CHINA	<b>SHEETS DRAWINGS</b> 6	<b>TOTAL CLAIMS</b> 17	<b>INDEPENDENT CLAIMS</b> 4
<b>ADDRESS</b> HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195 UNITED STATES						
<b>TITLE</b> Method and apparatus for managing route information and forwarding data in access devices						
<b>FILING FEE RECEIVED</b> 1330	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		



PATENT

AF\*

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 12/310,660 Group Art Unit: 2474

Filing Date: May 29, 2009 Examiner: Frank Duong

Applicant: Qin YIN et al.

Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES

Attorney Docket: 29250H-000013/US

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Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
**Mail Stop AF**

January 10, 2013

**AMENDMENT UNDER 37 CFR 1.116**

Sir:

In response to the Final Office Action mailed September 11, 2012, the due date being extended by a one month extension of time to January 11, 2013, the following amendments and remarks are respectfully submitted in connection with the above-identified application.

**Amendments to the Claims** begin on page 2 of this Amendment.

**Remarks** begin on page 7 of this Amendment.

	Claims remaining after Response		Highest number previously paid for		Present extra
<b>Total</b>	12	-	20	=	0
<b>Independent</b>	4	-	4	=	0

01/11/2013 SHOHANNE 00000003 12310660


01 FC:1251

150.00 OP

**EAST Search History****EAST Search History (Prior Art)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	7	Yin-Qin.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:05
L2	2	Miu-Yingzhong.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:05
L3	79	Zhu-Jianhua.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:05
L4	2	Yao-Yifeng.in.	US-PGPUB; USPAT; EPO; DERWENT	OR	ON	2013/01/17 15:05

**1/ 17/ 2013 3:05:47 PM**

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  12310660	<b>Applicant(s)/Patent Under Reexamination</b>  YIN ET AL.
	<b>Examiner</b>  FRANK DUONG	<b>Art Unit</b>  2474

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	10/18/2010	03/28/2011	07/17/2011	03/18/2012	09/04/2012	01/17/2013		
1	1	✓	÷	✓	✓	✓	=		
	2	✓	÷	✓	O	O	-		
3	3	O	÷	O	O	O	=		
4	4	✓	÷	✓	O	O	=		
5	5	✓	÷	✓	O	O	=		
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8	8	O	÷	O	O	O	=		
9	9	✓	÷	✓	O	O	=		
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	11	✓	÷	N	N	N	-		
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	13	✓	÷	N	N	N	-		
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12	16	✓	÷	✓	✓	✓	=		
	17	✓	÷	N	-	N	-		
2	18					✓	=		
7	19					✓	=		

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	((receiv\$4 near4 ((access adj response) or (DHCP near4 (response or offer)))) and (obtain\$4 near4 ((rout\$8 near4 (information or address)))) and (time near3 (using or expir\$4 or live)) and (updat\$4 near4 (rout\$4 near5 (table or item))))).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/01/17 15:37

1/ 17/ 2013 3:38:14 PM



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660                      Group Art Unit: 2474  
Filing Date: May 29, 2009                      Examiner: Frank Duong  
Applicant: Qin YIN et al.  
Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN ACCESS  
DEVICES  
Attorney Docket: 29250H-000013/US

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February 5, 2013

**STATEMENT UNDER 37 C.F.R. § 1.133(b)**

Sir:

In response to the telephonic interview conducted on December 27, 2013 and the Interview Summary dated January 10, 2013, the following remarks are respectfully submitted in connection with the above-identified application.

**Interview Summary**

Initially, Applicants wish to thank the Examiner for the courtesies extended to Applicants' representative during the telephonic interview of December 27, 2012. The parties discussed the 35 U.S.C. §102 rejection to the independent claims with respect to Radia. The parties discussed potential amendments to the claims to overcome the current rejections. The Examiner emphasized that Applicants should amend to incorporate the allowable subject matter of claim 2. The previous amendments to claim 1 took into consideration the Examiner's comments.

Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

**CONCLUSION**

Should there be any outstanding matters that need to be resolved in the present application; the Examiner is respectfully requested to contact the undersigned at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKY, & PIERCE, P.L.C.

By: 

Gary D. Yacura, Reg. No. 35,416

P.O. Box 8910  
Reston, Virginia 20195  
(703) 668-8000

GDY/CXM:pes

*Cw*

1687159.1

**Electronic Acknowledgement Receipt**

<b>EFS ID:</b>	14875604
<b>Application Number:</b>	12310660
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2600
<b>Title of Invention:</b>	METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES
<b>First Named Inventor/Applicant Name:</b>	Qin Yin
<b>Customer Number:</b>	30594
<b>Filer:</b>	Gary Daniel Yacura/Patricia Sandoval
<b>Filer Authorized By:</b>	Gary Daniel Yacura
<b>Attorney Docket Number:</b>	29250H-000013/US
<b>Receipt Date:</b>	05-FEB-2013
<b>Filing Date:</b>	29-MAY-2009
<b>Time Stamp:</b>	11:22:43
<b>Application Type:</b>	U.S. National Stage under 35 USC 371

**Payment information:**

Submitted with Payment	no
------------------------	----

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant summary of interview with examiner	20130205_ResponseTo_InterviewSummary.PDF	64872 fa3c2315135c8912d830e684ce9fb5baa9abdd0f	no	2

**Warnings:****Information:**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

U.S. Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

**PATENT****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 12/310,660                      Group Art Unit: 2474  
Filing Date: May 29, 2009                      Examiner: Frank Duong  
Applicant: Qin YIN et al.  
Title: METHOD AND APPARATUS FOR MANAGING ROUTE  
INFORMATION AND FORWARDING DATA IN  
ACCESS DEVICES  
Attorney Docket: 29250H-000013/US

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**February 28, 2013****SUBMISSION OF ART**


Sir:

Please place the attached references in the USPTO file for the above-identified patent. These references were cited in an European Search Report issued in European Application No. 07785346.3 dated March 8, 2012. By making this submission, Applicants do not admit that these references are material to or affect the validity of the instant claims.

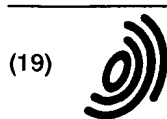
Document	Date	Inventor(s)
EP 0 886 404 A2	December 23, 1998	Shinya Kano, et al.
Non-Patent Literature	<p>(1) R. Woundy (Comcast Cable), K. Kinnear (Cisco Systems) "Dynamic Host Configuration Protocol (DHCP) Leasequery; rfc4388.txt;" 1 February 2006 (2006-02-01), XPO15044820, ISSN:0000-0003</p> <p>(2) R. Droms (Bucknell University) "Dynamic Host Configuration Protocol; rfc2131.txt", 1 March 1997 (1997-03-01) XPO15007915. ISSN: 0000-0003</p>	

U.S. Application No. 12/310,660  
Attorney Docket No. 29250H-000013/US

Respectfully submitted,  
HARNES, DICKY & PIERCE, P.L.C.

By:   
\_\_\_\_\_  
Gary D. Yacura, Reg. No. 35,416  
P.O. Box 8910  
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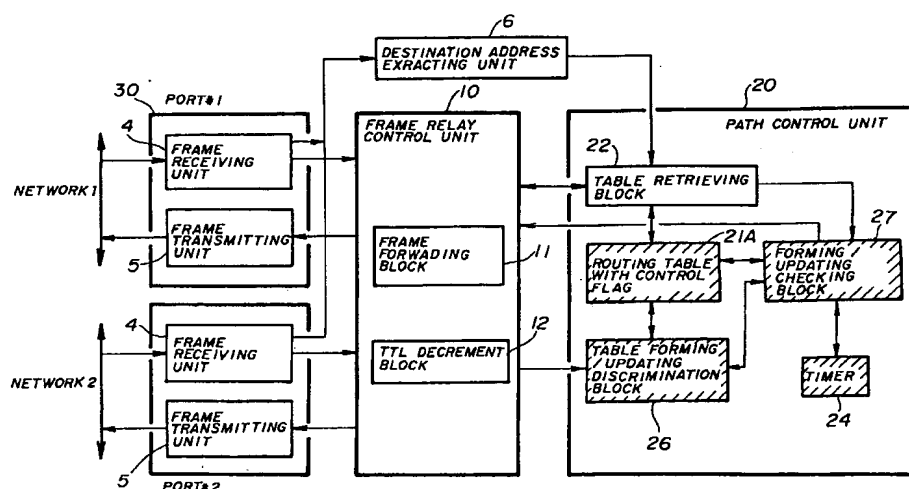
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## (54) Frame relay system

(57) A frame relay system relays a received frame having a destination address and a frame TTL indicating a term of life of the received frame. The frame relay system includes a routing table having entries, each of the entries indicating a relationship between a destination address and a control information item, a retrieving unit for retrieving the routing table based on a destination address included in the received frame, and a frame control unit for carrying out a decrement calculation of

the frame TTL of the received frame when a period of time has elapsed from a time at which an entry hit in retrieving of the routing table by the retrieving unit was formed or updated is not equal to or greater than a predetermined value and for not carrying out the decrement calculation of the frame TTL when the period of time period is equal or greater than the predetermined value.

FIG. 6



EP 0 886 404 A2

**Description****BACKGROUND OF THE INVENTION****(1) Field of the Invention**

The present invention generally relates to a frame relay system connecting networks to each other, particularly to a frame relay system which relays frames each of which has a destination address and a frame time-to-live (TTL) as control information. The frame TTL indicates the number of times which a frame can be relayed.

**(2) Description of the Related Art**

In a frame relay system connecting network to each other, a frame having a format as shown in Fig. 1 is used. That is, the frame has a destination address 1, a frame time-to-live (TTL) 2 and data 3.

A conventional communication is preformed in accordance with a procedure in which a transmission terminal transmits frames, each frame having the frame TTL set at a value, and the frame relay system decrements the value of the frame TTL when relaying each of the frames. The frame relay system has a unit for deleting a frame when the value of the frame TTL reaches zero "0". That is, each of the frames is provided with a term of life so that frames are not infinitely circulating through a network.

A decrement process of the frame TTL in the frame relay system is applied to all the frames which should be relayed. As a result, the delay time of the relay process is increased, so that the relay process is inhibited from being performed at a high speed.

Fig. 2 is a block diagram illustrating a conventional frame relay system. Referring to Fig. 2, the frame relay system has a frame receiving unit 4 and a frame transmitting unit 5. The frame receiving unit 4 receives frames from a network and converts a format of each of the received frames into a format which can be processed in the system. The frame transmitting unit 5 converts a format of each of frame processed in the system into a format which can be output to the network and outputs the processed frame to the network. A set of the frame receiving unit 4 and the frame transmitting unit 5 is provided for each of the networks to which the system is connected. In this example shown in Fig. 2, a set of the frame receiving unit 4 and the frame transmitting unit 5 is provided for each of the networks 1 and 2.

The frame relay system further has a frame relay control unit 10, a path control unit 20 and a destination address extracting unit 6. The frame relay control unit 10 is connected to the frame receiving unit 4 and the frame transmitting unit 5 and carries out a frame relay control process. The frame relay control unit 10 has a frame forwarding block 11 for forwarding frames to the network, a TTL decrement block 12 for decrementing

the value of the frame TTL and a header-check-sum calculation block 13.

The path control unit 20 is connected to the frame relay control unit 10 and controls paths. The path control unit 20 has a routing table 21, a table retrieving block 22 and a table forming/updating block 23. The routing table 21 indicates a destination address of each frame and control information corresponding to the destination address. The table retrieving block 22 retrieves that routing table 21. The table forming/updating block 23 forms and updates the routing table 21.

The destination address extracting unit 6 extracts a destination address from each frame received by the frame receiving unit 4. The destination address extracted by the destination address extracting unit 6 is supplied to the path control unit 20.

The conventional frame relay system performs processes in accordance with procedures as shown in Fig. 3. A description will now be given, with reference to Fig. 3, of the frame relay operation.

The frame receiving unit 4 receives a frame from the network and converts the format of the frame into a format which can be processed in the system (a frame receiving process S1).

The destination address extracting unit 6 extracts a destination address from the frame received by the frame receiving unit 4 (S2). The table retrieving block 22 receives the destination address from the destination address extracting unit 6 and retrieves the routing table 21 based on the received destination address (S3). It is checked whether the received destination address corresponds to the present frame relay system (the present station) (S4). The routing table 21 indicates a relationship between destination addresses and output ports as shown in Fig. 4 so that an output port can be decided based on a destination address.

The routing table 21 is formed by deciding a path, namely an output port, corresponding to a destination address in a received path information frame.

When the destination address does not correspond to the present frame relay system, the TTL decrement block 12 decrements a value of the frame TTL to avoid infinitely circulating through the network. If the value of the frame TTL reaches zero "0", the frame is deleted.

The frame forwarding block 11 forwards the frame to the frame transmitting unit 5 corresponding to the output port decided by the table retrieving block 22.

The frame transmitting unit 5 corresponding to the output port converts the frame format used in the system into a frame format which can be output to the network and then outputs the frame to the network.

When it is determined, in step S4, that the destination address corresponds to the present frame relay system, the system determines whether the received frame is a path information frame (S5). If the received frame is the path information frame, the system forms or updates the routing table 21 (S6).

When the frame is relayed with the decrement of



the value of the frame TTL, the process time is increased. Thus, to achieve the fast relay process, a method for relaying the frame without the decrement of the value of the frame TTL may be used.

Even if frames are relayed without the decrement of the value of the frame TTL, due to forwarding of frames in accordance with the routing table, the frames can be relayed without errors in a case where the network is formed in a tree-structure. However, if the network structure is complex so that a circular path exists in the network, frames may circulates through the network so as to not reach any stations.

A description will now be given of states where the frame circulation occurs.

#### (1) Change of Routing Table

Each frame relay system receives path information frames from an adjacent frame relay system and decides paths to which frames should be relayed. The routing table indicating the relationship between destination addresses and output ports is then formed (see Fig. 4). In a state where a sufficient time elapses from a start of services in the network and the network is in a stationary state, an output port corresponding to each of the destination address is uniquely decided in each frame relay system. In the stationary state, frames are relayed to paths in accordance with the routing table, so that the frames can reach the destinations without circulating through the network.

In cases where network equipment trouble and disconnection of a path in the network occur, relaying paths are changed based on information relating to the trouble included in the path information frame so that restoration of the relaying paths is attempted. In this case, if all the frame relay systems in the network simultaneously change the relaying paths, that is, if the routing tables are simultaneously updated in all the frame relay systems, the relay paths are restored without problems.

However, the routing tables are updated separately in the respective frame relay systems, and it takes a long time until the routing tables are updated in all the frame relay systems so that the network becomes in a stationary state. In a transition period until the network becomes in the stationary state, the circulating paths of the frames may occur, so that a frame transmitted in the transition period may be circulated through the network. A description will be given of an example of the circulation of the frame.

Figs. 5A through 5D illustrates the circulation of the frames based on disagreement of the routing tables with each other. It is supposed that a frame is relayed from a frame relay system B to a frame relay system (hereinafter, referred to as a relay system) G in a network shown in Fig. 5A.

Each relay system receives a path information frame including path information from an adjacent relay

system and obtains a shortest path to the relay system G. Paths from the respective relay systems to the relay system G are formed as shown in Fig. 5B.

In a case where frames are transmitted from the relay system B to the relay system G, the frames travel through a path (the relay system B → the relay system C → the relay system G).

In a case where communication between the relay systems C and G is suspended due to a problem occurring in a transmission line (a trouble position is indicated by an x shown in Fig. 5C), the relay system C informs an adjacent relay system, using a path information frame, that a problem has occurred in a transmission line between the relay systems C and G. The difference between receiving timings of the path information frames and the difference between updating process for the routing tables in relay systems create the disagreement of the path information in the network. For example, the routing tables of only the relay systems C and D are updated and the routing tables of other relay systems have not yet been updated.

In this case, when a frame is transmitted from the relay system B to the relay system G again, the frame is circulated through a path (the relay system B → the relay system C → the relay system D → the relay system A → the relay system B). Fig. 5C illustrates the circulation of the frame in the transition period.

When the network has been restored, as shown in Fig. 5D, frames are transmitted through a path (the relay system B → the relay system A → the relay system E → the relay system F → the relay system G).

As has been described above, if a frame is not deleted based on a value of the frame TTL of the frame, the frame which is circulated in the network can not be eliminated. That is, in a case where the decrement process of the value of the frame TTL is not performed, although the fast relay process can be attempted, the frame which is circulated in the network can not be eliminated.

#### (2) Static Path

In the relay system, there is a path statically decided by an administrator other than a path decided based on the path information frame. Hereinafter, the path statically decided is referred to as a static path. If the administrator generates, for any reason, a static path which is a circulating path, frames are circulated in the network.

As has been described above, although the circulation of frames through the network can be avoided by the decrement process of the value of the frame TTL, the relay process is delayed. As a result, the fast relay process can not be attempted.

On the other hand, although the fast relay process can be attempted by relaying frames without the decrement process of the value of the frame TTL, a frame can not be eliminated if the circulation of the frame occurs.

In addition, although the fast relay process can be attempted by relaying frames without the decrement process of the value of the frame TTL, an area to which frames are relayed can not be limited.

Further, although the fast relay process can be attempted by relaying frames without the decrement process of the value of the frame TTL, applications using the decrement of the value of the frame TTL can not be used.

#### SUMMARY OF THE INVENTION

Accordingly, a general object of the present invention is provide a novel and useful frame relay system in which the disadvantages of the aforementioned prior art are eliminated.

A specific object of the present invention is to provide a frame relay system by which the fast relay process can be attempted.

Another object of the present invention is to provide a frame relay system by which the frames can be prevented from being circulated in the network.

The above objects of the present invention are achieved by a frame relay system which relays a received frame having a destination address and a frame TTL indicating a term of life of the received frame, the system comprising: a routing table having entries, each of the entries indicating a relationship between a destination address and a control information item; retrieving means for retrieving the routing table based on a destination address included in the received frame; and frame control means for carrying out a decrement calculation of the frame TTL of the received frame when a period of time elapsed from a time at which an entry hit in retrieving of the routing table by the retrieving means was formed or updated is not equal to or greater than a predetermined value and for not carrying out the decrement calculation of the frame TTL when the period of time period is equal or greater than the predetermined value.

According to the present invention, only in a case where a time period that has elapsed from a time at which the routing table is formed or updated does not exceed the predetermined time, the decrement calculation of the frame TTL is carried out. Thus, the fast relay operation can be carried out and the frames are prevented from being circulated through the network.

Each of the entries in the routing table may have an area in which a time at which the entry is formed or updated should be written. In this case, the frame control means may include: means for writing a forming/updating time at which an entry is formed or updated in the routing table in the area of the entry when the entry is formed or updated; and calculation means for, in a frame relay operation, calculating the period of time elapsed from a time at which an entry hit in retrieving of the routing table was formed or updated based on the forming/updating time of the entry. In this

aspect of the present invention, the frame control means carries out the decrement calculation of the frame TTL when the calculated period of time is equal to or less than the predetermined value. As a result, the fast relay operation can be carried out and the frames can be prevented from being circulated through the network.

Each of the entries in the routing table may have a first area in which a time at which the entry is formed or updated should be written and a second area in which a flag indicating that an updating process for the entry has been completed should be written. In this case, the frame control means may includes: means for writing a forming/updating time at which an entry is formed or updated in the routing table in the area of the entry when the entry is formed or updated and resetting the flag; and calculation means for, in a frame relay operation, calculating the period of time elapsed from a time at which an entry hit in retrieving of the routing table was formed or updated based on the forming/updating time of the entry if the flag of the entry has not yet been set. In this aspect of the present invention, the frame control means carries out the decrement calculation of the frame TTL when the calculated period of time is equal to or less than the predetermined value, and the frame control means does not carry out the decrement calculation of the frame TTL and sets the flag when the calculated period of time is equal to or greater than the predetermined value. As a result, the fast relay operation can be carried out and the frames can be prevented from being circulated through the network.

Each of the entries in the routing table may have a first area in which a time at which the entry is formed or updated should be written and a second area in which a flag indicating an updating process for the entry has been completed should be written. In this case, the frame control means may include: means for writing a forming/updating time at which an entry is formed or updated in the routing table in the area of the entry when the entry is formed or updated and resetting the flag; calculation means for monitoring flags for the respective entries in the routing table and calculating a period of time elapsed from a time at which an entry for which the flag has not yet been set was formed or updated; and means for setting the flag of an entry in which the calculated period of time is equal to or greater than a predetermined value. In this aspect of the present invention, the frame control means carries out the decrement calculation of the frame TTL when the flag of the entry hit in retrieving of the routing table has not yet been set. As a result, the fast relay operation can be carried out and the frame can be prevented from being circulated through the network.

Each of the entries in the routing table may have an area in which a flag indicating that an updating process for the entry has been completed should be written. In this case, the frame relay control means may include: means for resetting the flag of an entry when the entry

is formed or updated; and means for setting flags for all the entries at predetermined intervals. In this aspect of the present invention, the frame relay means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of the routing table has not yet been set in a frame relay operation. As a result, the fast relay operation can be carried out and the frames can be prevented from being circulated through the network.

Each of the entries in the routing table may have an area in which a flag indicating that an updating process for the entry has been completed should be written. In this case, the frame relay control means may include: a timer; means for resetting the flag of an entry and starting the timer from zero when the entry is formed or updated; and means for setting the flags of all the entries in the routing table when a value of the timer reaches a predetermined value. In this aspect of the present invention, the frame relay control means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of the routing table has not yet been set in a frame relay operation. As a result, the fast relay operation can be carried out and the frames can be prevented from being circulated through the network.

Each of the entries in the routing table may have a first area in which a first flag indicating that a updating process for the entry has been completed should be written and a second area in which a second flag indicating that the entry is being updated. In this case, the frame relay control means may include: means for resetting the first and second flags of an entry when the entry is formed or updated; means for monitoring the routing table; means for setting the second flag of an entry for which it is detected based on a monitoring result that neither the first flag nor the second flag has not yet been set; and means for setting the first flag of an entry for which it is detected based on the monitoring result that only the first flag has not yet been set. In this aspect of the present invention, the frame relay control means carries out the decrement calculation of the frame TTL when the first flag of an entry hit in retrieving of the routing table has not yet been set in a frame relay operation. As a result, the fast relay operation can be carried out and the frames can be prevented from being circulated.

Each of the entries in the routing table may have an area in which a flag indicating that the entry corresponds to a static path should be written. In this case, the frame relay control means may include: means for setting the flag of an entry when an administrator of the system specifies the entry corresponding to the static path. In this aspect of the present invention, the frame relay control means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of the routing table has been set in a frame relay operation. As a result, frames which should be relayed to the static path can be prevented from being circulated

through the network.

The frame relay control means may include: means for determining whether the received frame includes a multicast address or a specific terminal address which type of address indicates that the decrement calculation of the frame TTL should be carried out for the received frame or whether the received frame is a frame belonging to a specific protocol. In this aspect of the present invention, the frame relay control means carries out the decrement calculation of the frame TTL when the means determines that the received frame includes the multicast address or the specific terminal address or that the received frame is the frame belonging to the specific protocol. As a result, the disadvantage caused by not carrying out the decrement calculation of the frame TTL can be eliminated.

Each of the entries in the routing table may have an area in which a flag indicating that the decrement calculation of the frame TTL should be compulsorily carried out. In this case, the frame control means may include: means for setting the flag of an entry corresponding to a path to which a frame should be relayed after the decrement calculation of the frame TTL is carried out. In this aspect of the present invention, the frame relay control means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of the routing table has been set in a frame relay operation. As a result, the disadvantage caused by not carrying out the decrement calculation of the frame TTL can be eliminated.

The above frame relay system may further includes a table separated from the routing table, the table indicating that each of the output ports is a port for which the decrement calculation of the frame TTL should be carried out. In this aspect of the present invention, the frame relay control means carries out the decrement calculation of the frame TTL when it is determined with reference to the table that an output port decided by retrieving of the routing table is the port for which the decrement calculation of the frame TTL should be carried out. As a result, the disadvantage caused by not carrying out the decrement calculation of the frame TTL can be eliminated.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the present invention will be apparent from the following description when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a diagram illustrating a conventional format of a frame;

Fig. 2 is a block diagram illustrating a conventional frame relay system;

Fig. 3 is a flowchart illustrating procedures of operations of the conventional frame relay system;

Fig. 4 is a diagram illustrating a routing table;

Figs. 5A, 5B, 5C and 5D are diagrams illustrating circulation of frames based on disagreement of routing tables;

Fig. 6 is a block diagram illustrating a frame relay system according to a first embodiment of the present invention;

Fig. 7 is a block diagram illustrating a frame relay system according to a second embodiment of the present invention;

Fig. 8 is a block diagram illustrating the frame relay system according to a third embodiment of the present invention;

Fig. 9 is a block diagram illustrating the frame relay system according to a fourth embodiment of the present invention;

Fig. 10 is a flowchart illustrating a first example of processes in the frame relay system;

Fig. 11 is a diagram illustrating a routing table used in the first example of the processes;

Fig. 12 is a flowchart illustrating a second example of processes in the frame relay system;

Fig. 13 is a diagram illustrating a routing table used in the second example of the processes;

Fig. 14 is flowchart illustrating a third example of processes in the frame relay system;

Fig. 15 is a diagram illustrating a routing table used in the third example of the processes;

Fig. 16 is a flowchart illustrating a fourth example of processes in the frame relay system;

Fig. 17 is a diagram illustrating a routing table used in the fourth example of the processes;

Fig. 18 is a flowchart illustrating a fifth example of processes in the frame relay system;

Fig. 19 is a diagram illustrating a routing table used in the fifth example of the processes;

Fig. 20 is a flowchart illustrating a sixth example of processes in the frame relay system;

Fig. 21 is a diagram illustrating a routing table used in the sixth example of the processes;

Fig. 22 is a diagram illustrating another routing table;

Fig. 23 is a diagram illustrating a format of a frame; and

Figs. 24 and 25 are diagrams illustrating other routing tables.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

A description will be given, with reference to Fig. 6, of a frame relay system according to a first embodiment of the present invention. In Fig. 6, those parts which are the same as those shown in Fig. 2 are given the same reference numbers.

Referring to Fig. 6, two ports 30 (#1 and #2) respectively connected to networks are provided. The number of ports is not limited to this.

Each of the ports 30 has the frame receiving unit 4

and the frame transmitting unit 5. The frame receiving unit 4 receives frames from the network and converts the format of each of the frames into a frame format which can be processed in the system. The frame transmitting unit 5 converts the frame format of each processed frame into a format which can be output to the network and outputs the processed frame to the network.

The path control unit 20 controls paths. The path control unit 20 has a routing table 21A, the table retrieving block 22, a table forming/updating discrimination block 26, a timer 24 and a forming/updating checking block 25. The routing table 21A has destination addresses of frames and control information (e.g., various flags) corresponding to the destination addresses. The table retrieving block 22 retrieves the routing table 21A using a destination address of a received frame as a key and decides an output port. The table forming/updating discrimination checking block 26 forms and updates the routing table 21A based on a received path information frame. The timer 24 is used to check whether a period of time has elapsed from a time at which an entry was formed or updated in the routing table 21A is equal to or greater than a predetermined value. The forming/updating checking block 25 checks, with reference to the timer 24 and the routing table 21A, whether a period of time that has elapsed from a time at which an entry was formed or updated in the routing table 21A is equal to or greater than the predetermined value so that a forming/updating process of the routing table 21A is completed.

The frame relay control unit 10 carries out the frame relay control. The frame relay control unit 10 has the frame forwarding block 11 and the TTL decrement block 12. The frame forwarding block 11 forwards frames from the frame receiving unit 4 of the input port to the frame transmitting unit 5 of the output port in accordance with instructions from the table retrieving block 22. The TTL decrement block 12 carries out the TTL decrement calculation of the frame TTL of frames in accordance with instructions from the forming/updating checking block 25. The destination address extracting unit 6 extracts a destination address of a frame from the frame receiving unit 4 and supplies it to the table retrieving block 22.

The path control unit 20 has the following function. When a period of time that has elapsed from a time at which an entry is hit in retrieving of the routing table 21, based on a destination address of a received frame, was formed or updated is not equal to or greater than the predetermined value, the TTL decrement calculation of the frame TTL of the frame to be relayed is carried out. On the other hand, when a period of time that has elapsed from the time at which an entry is hit in retrieving the routing table 21 is equal to or greater than the predetermined value, the TTL decrement calculation of the frame TTL of the frame is not carried out.

In the present invention, based on whether or not a period of time elapsed from a time at which an entry of



the routing table 21A was formed or updated is equal to or greater than the predetermined value, based on whether or not an output path of a frame is a relaying path decided by an administrator, based on whether or not a received frame has an address for which it is decided by an administrator that the TTL decrement calculation should be carried out or belongs to a protocol, and whether or not an output port for which it is determined by an administrator that the decrement calculation should be carried out is obtained, it is determined whether the TTL decrement calculation should be carried out and the frame is relayed.

In the stationary state in which the network topology is not changed, the circulation of the frame does not occur. In a case where the network topology is changed and the relaying path is changed, that is, in a case where the routing table 21A is updated, the circulation of the frame occurs.

Thus, in the present invention, in the stationary state where entries of the routing table 21A are not updated, the TTL decrement calculation is not carried out. On the other hand, when a period of time has elapsed from a time at which an entry of the routing table 21A was formed or updated is equal to or less than the predetermined time, the TTL decrement block carries out the TTL decrement calculation. As a result, the fast relay process can be attempted and the frames can be prevented from being circulated through the network.

A description will now be given of the frame relay system according to a second embodiment of the present invention.

The frame relay system according to the second embodiment of the present invention is formed as shown in Fig. 7. In Fig. 7, those parts which are the same as those shown in Fig. 6 are given the same reference numbers. In the frame relay system shown in Fig. 6, when an output port of a received frame corresponds to a static path set by an administrator, the frame can not be prevented from being circulated through the network.

Thus, in the frame relay system according to this embodiment, when the output port of the received frame corresponds to the static path set by the administrator, the TTL decrement calculation is always carried out. Referring to Fig. 7, the path control unit 20 further has a static path determination block 27. The path determination block 27 determines whether an output path is a static path and supplies instructions for the TTL decrement calculation to the frame relay control unit 10 based on a determination result. Other elements shown in Fig. 7 are the same as those shown in Fig. 6.

A description will be given of the frame relay system according to a third embodiment of the present invention.

The frame relay system according to the third embodiment is formed as shown in Fig. 8. In Fig. 8, those parts which are the same as those shown in Fig. 6 are given the same reference numbers. In the frame

relay system according to this embodiment, disadvantages caused by not performing the TTL decrement calculation in the frame relay system which is relaying frames are eliminated.

The feature of the conventional system by which the TTL decrement calculation is carried out is used. A network system may be formed in which an area in which a frame having the frame TTL set at a value can be relayed is limited. In this case, if a frame relay system in which the TTL decrement calculation is not carried out is provided in the area, the frame may be relayed to an area which is not desired by an operator of the transmission terminal.

Thus, in the frame relay system according to this embodiment, in a case where a frame having a specific address and a frame belonging to a specific protocol are relayed, the TTL decrement calculation is carried out. Referring to Fig. 8, the path control unit 20 further has a frame discrimination block 28. The frame discrimination block 28 discriminates the frame having the specific address and the frame belonging to the specific protocol from other kinds of frames. The frame discrimination block 28 supplies, based on the discrimination result, instructions for carrying out the TTL decrement calculation to the frame relay control unit 10. Other elements shown in Fig. 8 are the same as those shown in Fig. 6.

A description will now be given, with reference to Fig. 9, of the frame relay system according to a fourth embodiment.

The frame relay system according to the fourth embodiment of the present invention is formed as shown in Fig. 9. In Fig. 9, those parts which are the same as those shown in Fig. 6 are given the same reference numbers. In the frame relay system according to this embodiment, disadvantages caused by not performing the TTL decrement calculation in the frame relay system which is relaying frames are eliminated.

For example, some kinds of application software for checking states of the network are used under a condition in which the TTL decrement calculation is carried out in each frame relay system. These kinds of application are not normally operated under a condition in which the TTL decrement calculation is not carried out in a frame relay system.

However, in a case where frames to be relayed to a destination use the application software having the above property, an administrator carries out the TTL decrement calculation for all the frames to be relayed to the destination, so that the operations can be guaranteed.

Thus, the frame relay system is provided with a function for compulsorily carrying out the TTL decrement calculation when a frame is relayed to a specific path. The specific path can be decided by the administrator of the relay system. Referring to Fig. 9, the path control unit 20 further has an output port determination block 29. The output port determination block 29 determines whether a port used to output frames is a port

13

EP 0 886 404 A2

14

which requires the TTL decrement calculation. The output port determination block 29 supplies instructions, based on the determination result, for carrying out the TTL decrement calculation to the frame relay control unit 10. Other elements shown in Fig. 9 are the same as those shown in Fig. 6.

A description will now be given of examples of operations of the relay system. The relay system used is one of those shown in Figs. 6 through 9.

#### (1) The Example 1

In this example, an area in which a time an entry is formed or updated should be written is provided in each entry in the routing table. When an entry (a path) is formed or updated, a time at which the entry is formed or updated (a forming/updating time) is written in the area. When a frame is relayed, a period of time that has elapsed from a time at which an entry hit in retrieving of the routing table was formed or updated is calculated based on the forming/updating time written in the area of the entry. When the calculated period of time is equal to or less than a predetermined value, the TTL decrement calculation is carried out. For every frame to be relayed, the period of time is calculated. In the examples 1 through 6, the frame relay system as shown in Fig. 6 is used.

In the example 1, a process is executed in accordance with a procedure shown in Fig. 10. In this example, the routing table 21A is formed as shown in Fig. 11. The routing table 21A has destination addresses and the output ports (see Fig. 4) and further has an area in which a forming/updating time for each entry (including a set of a destination address and a corresponding output port) should be written. Referring to Fig. 11, the routing table is provided with a destination address area 21a, an output port area 21b and an updating time area 21c.

#### (Updating of the Routing Table)

The frame receiving unit 4 carries out a receiving process for receiving a frame from the network and converting the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output port using the destination address extracted from the received frame as a key (S3).

It is then checked, based on a retrieving result, whether the received frame is a path information frame for the present system (S4).

If the received frame is a path information frame for the present system, the table forming/updating discrimination block 26 updates the routing table 21A (S5).

Further, it is checked whether an entry in the routing table 21A has been formed or updated (S6). If an entry has been formed or updated, the table forming/updating discrimination block 26 writes a forming/updating time in the routing table 21A with reference to the timer 24.

#### (The Frame Relaying Process)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output port using the destination address extracted from the received frame as a key (S3). It is then checked whether the received frame is a frame to be processed in the present system (S4).

If the received frame is not a frame to be processed in the present system, the table retrieving block 22 decides an output port corresponding to the destination address from the routing table 21A. The forming/updating checking block 25 reads out a forming/updating time of an entry hit in the retrieving process from the routing table 21A. The forming/updating checking block 25 then calculates a period of time that has elapsed from a time at which the entry was formed or updated by comparing the present time indicated by the timer 24 and the forming/updating time (S8).

In a case where the calculated period of time has not yet reached a predetermined value, the forming/updating checking block 25 applies instructions for the TTL decrement calculation to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions from the forming/updating checking block 25, the frame relay control unit 10 causes the TTL decrement block 12 to carry out the TTL decrement calculation (S9). Frame data is then supplied to the frame transmitting unit 5 of the output port which has been decided by the table retrieving block 22.

The frame transmitting unit 5 converts the frame format of the frame supplied from the frame forwarding block 11 of the frame relay control unit 10 into a frame format suitable for the network and outputs the frame to the network (S10).

According to the example 1, in a case where a period of time has elapsed from a time at which an entry hit in the retrieving process for the routing table was formed or updated is equal to or less than the predetermined value, the TTL decrement calculation is carried out. Thus, the fast relay process can be performed and the frames can be prevented from being circulated through the network.

## (2) The Example 2

In this example, an area in which a time at which an entry is formed or updated is written and an area in which a flag indicating that the updating process has been completed are provided in each entry in the routing table. When an entry (a path) is formed or updated, a time at which the entry is formed or updated (a forming/updating time) is written in the area and the flag is reset. In the frame relaying process, only when the flag of an entry hit in the retrieving of the routing table is not set, the period of time that has elapsed from the forming/updating time is calculated. Only when the calculated period of time is equal to or less than a predetermined value, the TTL decrement calculation is carried out. When the calculated period of time is greater than the predetermined value, the TTL decrement calculation is not carried out and the flag is set. The periods of time for all the frames to be relayed are not calculated. It is determined whether the flag in each entry is set, and the periods of time for only entries which have been updated are calculated.

In the example 2, a process is executed in accordance with a procedure shown in Fig. 12. In this example, the routing table 21A is formed as shown in Fig. 13. The routing table 21A has destination addresses and the output ports (see Fig. 4) and further has an area in which a forming/updating time for each entry should be written and an area in which flags indicating the entries has been updated should be written. Referring to Fig. 13, the routing table 21A is provided with a destination address area 21a, an output port area 21b, an updating time area 21c and a flag area 21d.

## (Updating of the Routing Table)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3).

It is checked whether the destination address corresponds to the present system (S4).

When it is determined that the received frame is the path information frame, the table forming/updating discrimination block 26 carries out a forming/updating process for the routing table 21A (S5).

It is further checked whether an entry in the routing table 21A is formed or updated (S6). If an entry is formed or updated, the flag in the entry is reset and an updating time is written in the updating time area 21c (S7).

## (Frame Relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3) and decides a corresponding output port.

It is then checked whether the destination address corresponds to the present system (S4). If the destination address does not correspond to the present system (S4), the forming/updating checking block 25 checks whether the flag in the flag area 21d of the entry (the output port) hit in retrieving of the routing table 21A has been set (S8).

If the flag has not yet been set, a forming/updating time of the entry is read out and a period of time from the forming/updating time to the resent time indicated by the timer 24 is calculated (S9).

If the calculated period of time is not equal to or greater than the predetermined value, instructions for the TTL decrement calculation are supplied to the frame relay control unit 10. If the period of time that has elapsed from a time at which the entry was formed or updated is greater than the predetermined value, the flag indicating that the updating process has been completed is set in the flag area 21d (S12).

When the frame relay control unit 10 receives the instructions from the forming/updating checking block 25, the frame relay control unit causes the TTL decrement block 12 to carry out the TTL decrement calculation (S11). Frame data is supplied to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

The frame transmission unit 5 converts the frame format of the frame supplied from the frame relay control unit 10 into a frame format suitable for the network and outputs the frame data to the network (S13).

According to the above example, only when the calculated period of time is equal to or less than the predetermined value, the TTL decrement calculation is performed. On the other hand, when the calculated period of time is greater than the predetermined value, the TTL decrement calculation is not performed, but only the flag is set. As a result, the fast relay process can be performed and the frames is prevented from being circulated through the network.

## (3) The Example 3

In this example, when an entry (a path) is formed or updated, a time at which the entry is formed or updated (the forming/updating time) is written in the routing table

17

EP 0 886 404 A2

18

and the flag in the entry is reset. The routing table is successively monitored. The period of time that has elapsed from a time at which an entry having the flag which has been not yet set was formed or updated is calculated. In the frame relay operation, when the flag of the entry hit in retrieving of the routing table has not yet been set, the TTL decrement calculation is carried out.

In this example, the routing table 21A is successively monitored and an entry is detected for which the period of time that has elapsed from a time at which the entry was formed or updated is equal to or greater than the predetermined value. As a result, in the frame relay operation, it can be determined, by only discrimination of the flag, whether the TTL decrement calculation should be carried out.

In the example 3, a process is executed in accordance with a procedure shown in Fig. 14. In this example, the routing table 21A is formed as shown in Fig. 15. The routing table 21A has an area in which a forming/updating time for each entry should be written and an area in which flags indicating the entries has been updated should be written. Referring to Fig. 15, the routing table 21A is provided with a destination address area 21a, an output port area 21b, an updating time area 21c and a flag area 21d.

#### (Updating of the Routing Table)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3).

The system checks whether the destination address corresponds to the present system (S4). The system recognizes, based on the checking result, that the destination is the present system.

If the received frame is a path information frame, the table forming/updating discrimination block 25 updates the routing table 21A (S5).

Further, it is checked whether an entry in the routing table has been formed or updated (S6). If an entry in the routing table has been formed or updated, the flag in the entry is reset and a forming/updating time is written with reference to the timer 24 (S7). When it is determined, in step S6, that any entry is neither formed nor updated, the step S7 is not performed.

#### (The Operation of the forming/updating checking block 25)

The forming/updating checking block 25 succe-

sively carries out the following process.

It is checked whether the flag in the flag area 21d for an entry is set (S11).

If the flag is not set, the period of time that has elapsed from a time at which the entry was formed or updated is calculated with reference to the timer 24 (S12).

It is then checked whether the elapsing time calculated above is equal to or greater than the predetermined value (S13). If the elapsed time is equal to or greater than the predetermined value, the flag in the flag area 21d is set (S14).

The next entry which should be processed is selected (if the processed entry is the last entry, the first entry is selected) and the above process from the step S11 is repeated for the selected entry (S15). If it is determined, in the step S11, that the flag has been set, the step S15 is performed in the same manner as in the above case.

#### (Frame relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into the frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3) so as to decide an output port.

The system checks whether the destination address corresponds to the present system (S4). If the destination address does not correspond to the present system, the forming/updating checking block 25 checks whether the flag in the flag area 21d has been set for the entry hit in retrieving of the routing table 21A (S8).

If the flag in the flag area 21d has not yet been set, the forming/updating checking block 25 supplies instructions for carrying out the TTL decrement calculation to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions from the forming/updating checking block 25, the frame relay control unit 10 causes the TTL decrement block 12 to carry out the TTL decrement calculation (S9). Frame data is supplied from the frame forwarding block 11 to the frame transmitting unit 5 of the output port decided from the routing table 21A.

The frame transmitting unit 5 converts the frame format of the frame into a frame format suitable for the network and outputs the frame data to the network (S10).

According to the example 3, in the frame relay operation, only when the flag of the entry hit in retrieving of the routing table is not set, the TTL decrement calculation is carried out. Thus, the fast relay operation can be



carried out and the frame can be prevented from being circulated through the network.

#### (4) The Example 4

In this example, for each entry in the routing table 21A, a flag indicating that the updating process has been completed is provided. When an entry (a path) is formed or updated, the flag of the entry is reset. The flag of each entry in the routing table 21A is set at predetermined intervals. In the relay operation, only when the flag of an entry hit in retrieving of the routing table 21A is not set, the TTL decrement calculation is carried out and the frame is relayed. Since the flag of each entry is set at the predetermined intervals, it can be determined based on the state of the flag whether the TTL decrement calculation should be carried out.

In the example 4, a process is executed in accordance with a procedure shown in Fig. 16. In this example, the routing table 21A is formed as shown in Fig. 17. The routing table 21A has the destination address area 21a, the output port area 21b and the flag area 21d.

#### (Updating of the Routing Table)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3).

It is then checked whether the destination address corresponds to the present system (S4). For example, it is assumed that the destination address corresponds to the present system.

If the frame transmitted to the present system is a path information frame, the table forming/updating discrimination block 26 updates the routing table 21A (S5).

Further, in a case where an entry in the routing table 21A is formed or updated, the forming/updating checking block 25 resets the flag in the flag area 21d for the entry (S7).

#### (Operation of the forming/updating checking block)

In addition, the forming/updating checking block 25 sets the flags of all the entries in the routing table 21A at predetermined intervals (S11).

#### (Frame Relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the

received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port (S3).

It is then checked whether the destination address corresponds to the present system (S4). If the destination address does not correspond to the present system, the forming/updating checking block 25 checks whether the flag in the flag area 21d for the entry (the output port) hit in retrieving of the routing table 21A is set (S8).

If the flag in the flag area 21d for the entry is not set, instructions for the TTL decrement calculation are supplied to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions, the TTL decrement calculation is carried out by the TTL decrement block 12 (S9).

The frame transmitting unit 5 converts the frame format of the frame supplied from the frame forwarding block 11 of the frame relay control unit 10 into a frame format suitable for the network and outputs the frame data to the network (S10).

According to the above example, only when the flag of the entry hit in retrieving of the routing table is not set, the TTL decrement calculation is carried out. Thus, the fast relay operation can be performed and the frames are not prevented from being circulated through the network.

#### (5) The Example 5

In this example, for each entry in the routing table 21A, a flag indicating that the updating process has been completed is provided. When an entry (a path) is formed or updated, the flag of the entry is reset and the timer 24 is caused to start from a value of "0". When the value of the timer 24 reaches a predetermined value, the flags for all the entries in the routing table 21A are reset. In the frame relay operation, only when the flag of an entry hit in retrieving of the routing table 21A is not set, the TTL decrement calculation is performed and the frame is relayed.

In the frame relay operation, it can be determined based only on the state of the flag whether the TTL decrement calculation should be performed. Further, although a case where the flag is not set is continued for a period of time greater than a predetermined value can not be guaranteed in the system according to the example 4, the system according to the example 5 guarantees such a case by resetting the value of the timer 24 to "0" and starting the timer 24 again.

In the example 5, a process is executed in accordance with a procedure shown in Fig. 18. In this example,

21

EP 0 886 404 A2

22

the routing table 21A is formed as shown in Fig. 19. The routing table 21A has the destination address area 21a, the output port area 21b and the flag area 21d.

#### (Updating of the Routing Table)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3).

The table retrieving block 22 checks whether the destination address corresponds to the present system (S4). For example, it is assumed that the destination address corresponds to the present system.

If the received frame is a path information frame, the table forming/updating discrimination block 26 updates the routing table 21A (S5).

It is then checked whether an entry in the routing table 21A has been formed or updated (S6). If an entry in the routing table 21A has been formed or updated, the forming/updating checking block 25 resets the flag in the flag area 21d (S7). The timer 24 is then reset to a value of "0" and started again (S8).

#### (Operation of the forming/updating checking block)

The forming/updating checking block 25 successively performs the following process.

The forming/updating checking block 25 checks the timer 24 and determines whether the value of the timer 24 is equal to or greater than a predetermined value (S12).

If the value of the timer 24 is equal to or greater than the predetermined value, the flags in the flag area 21d for all the entries in the routing table 21A are set (S13). The timer 24 is then reset to a value of "0" and the operation of the timer 24 is stopped (S14).

#### (Frame relay operation)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port (S3).

5

It is then checked whether the destination address corresponds to the present system (S4). If the destination address does not correspond to the present system, the forming/updating checking block 25 checks whether the flag of the entry (the output port) hit in retrieving of the routing table 21A has been set (S9).

10

If the flag has not yet been set, the forming/updating checking block 25 supplies instructions for the TTL decrement calculation to the frame relay control unit 10.

15

When the frame relay control unit 10 receives the instructions from the forming/updating checking block 25, the TTL decrement calculation is carried out by the TTL decrement block 12 (S10). Frame data is supplied to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

20

The frame transmitting unit 5 converts the frame format of the frame into a frame format suitable for the network and outputs the frame data to the network (S11).

25

According to the above example, only when the flag of the entry hit in retrieving of the routing table 21A has not yet been set, the TTL decrement calculation is carried out. Thus, the fast relay operation can be performed and the frame can be prevented from being circulated through the network.

#### (6) The Example 6

30

In this example, for each of the entries in the routing table 21A, a completely updated flag indicating that an entry has been formed or updated and an updating flag indicating that an entry is being updated are provided. When an entry (a path) is formed or updated, the completely updated flag and the updating flag are reset. The routing table 21A is monitored at predetermined intervals. In a case where neither the completely updated flag nor the updating flag are set, the updating flag is set. In a case where only the completely updated flag is not set, the completely updated flag is set. In the frame relay operation, only when the completely updated flag of an entry hit in retrieving of the routing table 21A is not set, the TTL decrement calculation is performed and the frame is relayed.

45

The routing table 21A is monitored at predetermined intervals. Sets of the updating flags and the completely updated flags for respective entries are successively set, so that it is guaranteed that a period of time for which each of the completely updated flags is not set is equal to or greater than a predetermined value. In addition, in the frame relay operation, it can be determined, based on only the state of the completely updated flag, whether the TTL decrement calculation should be carried out.

55

In the example 6, a process is executed in accordance with a procedure shown in Fig. 20. In this example, the routing table 21A is formed as shown in Fig. 21. The routing table 21A has the destination address area 21a, the output port area 21b, a completely updated flag area

21d and an updating flag area 21e.

(Updating of the Routing Table)

In this example, the routing table 21A has, as shown in Fig. 21, not only the destination addresses and the output ports but also the completely updated flags indicating that the forming/updating process for the entry has been completed and the updating flags indicating that the forming/updating process for the entry has not yet been completed.

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key (S3).

It is then checked whether the destination address corresponds to the present system (S4). For example, it is assumed that the destination address corresponds to the present system.

If the received frame is a path information frame, the table forming/updating discrimination block 26 updates the routing table 21 (S5).

Further, it is checked whether an entry has been formed or updated in the routing table 21A (S6). If an entry has been formed or updated in the routing table 21A, the flags in the completely updated flag area 21d and the updating flag area 21e are reset (S7).

(Operation of the forming/updating checking block)

The forming/updating checking block 25 periodically performs the following process.

The forming/updating checking block 25 checks the flags in the completely updated flag area 21e for each entry and determines whether the flag has been set (S11).

It is further checked whether the flags in the updating flag area 21e for entries having the completely updated flags which has not yet been set has been set (S12).

In a case where the flag in the completely updated flag area 21d has not yet been set and the flag in the updating flag area 21e has been set, the flag in the completely updated flag area 21d is set (S13).

In a case where the flags in neither the completely updated flag area 21e nor the updating flag area 21e has been set, the flag in the updating flag area 21e is set (S14).

The next entry which should be processed is selected and the above process from the step S11 is repeated for the selected entry (S15).

If the processed entry is the last entry, the first entry in the routing table 21A is selected. After a predetermined period of time elapses, the above process from the step S11 is repeated for the first entry.

(Frame Relay Operation)

In this case, the same frame operation as in the example 3 is performed.

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system (S1).

The destination address extracting unit 6 extracts a destination address from the received frame (S2).

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port (S3).

The system checks whether the destination address corresponds to the present system (S4). If the destination address does not correspond to the present system, the forming/updating checking block 25 checks whether the flag in the completely updated flag area 21d for the entry (the output port) hit retrieving of the routing table 21A has been set (S8).

If the flag in the completely updated flag has not yet been set, instructions for the TTL decrement calculation are supplied to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions from the forming/updating checking block 25, the frame relay control unit 10 causes the TTL decrement block 12 to carry out the TTL decrement calculation (S9). The frame data is then supplied to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

The frame transmitting unit 5 outputs the frame format of the frame into the frame format suitable for the network and outputs the frame data to the network (S10).

According to the above example, only when the completely updated flag of an entry hit in retrieving of the routing table 21A in the frame relay operation has been set, the TTL decrement calculation is carried out and the frame is relayed. Thus, the fast frame relay operation can be performed and the frame can be prevented from being circulated through the network.

(7) The example 7

In this example, each entry in the routing table is provided with a static path flag indicating the entry corresponds to a static path. The static path flag is set for a relaying path (an entry) which is set by an administrator. In the frame relay operation, if the static path flag of an entry hit in retrieving of the routing table 21A has been set, the TTL decrement calculation is carried out and

25

EP 0 886 404 A2

26

the frame is relayed. The relay system in the example 7 is formed as shown in Fig. 7.

In the example 7, the routing table 21A is formed as shown in Fig. 22. The routing table 21A has the destination address area 21a, the output port area 21b and the static path flag area 21f.

#### (Forming of the Routing Table)

An administrator of the relay system can decide a relaying path for a specific address or a sets of addresses corresponding to a specific condition. The relaying path can be recorded in the routing table 21A. The static path flag of an entry corresponding to the recorded relaying path is set.

#### (Frame Relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the frame format of the received frame into a frame format suitable for the system.

The destination address extracting unit 6 extracts a destination address from the received frame.

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port.

The static path determination block 27 checks whether the flag in the static flag area 21f for an entry hit in retrieving of the routing table 21A has been set.

When the flag in the static flag area has been set, the static path determination block 27 supplies instructions for the TTL decrement calculation to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions from the static path determination block 27, the TTL decrement calculation is carried out by the TTL decrement block 12. Frame data is supplied from the frame forwarding block 11 to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

The frame transmitting unit 5 converts the frame format of the frame into a frame format suitable for the network and outputs the frame data to the network.

According to the above example, when the static path flag of an entry hit in retrieving of the routing table 21A has been set, the TTL decrement calculation is carried out and the frame is relayed. Thus, the frames can be prevented from being circulated through the network caused by the static paths.

#### (8) The Example 8

In this example, when a frame is relayed, it is determined that the frame includes a multicast address, a specific terminal address or a specific protocol identification

number which frame should be applied with the TTL decrement calculation. If so, the TTL decrement calculation is carried out and the frame is then relayed.

In a case where a frame having a format as shown in Fig. 23 which differs from that shown in Fig. 1 is relayed, a transmitter address and a type of protocol may be selected as information to be checked in the same manner as the destination address. In the example 8, the frame format is formed as shown in Fig. 23. The frame includes a destination address 1, a transmitter address, a protocol identification number 42, a frame time-to-live (TTL) and data 3.

A description will now be given of a case where it is determined whether a frame has a multicast address or a specific address as the destination address or a specific protocol identification number. The frame relay system in this example is formed as shown in Fig. 8.

#### (Frame relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the format of the received frame into a format suitable for the system.

The destination address extracting unit 6 extracts a destination address from the received frame.

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port.

The frame discrimination block 28 determines whether the destination address 1 of the received frame is a multicast address or a specific address or whether the protocol identification number of the received frame is the specific protocol identification number. If the destination address 1 of the received frame is the multicast address or the specific address, instructions for the TTL decrement calculation are supplied to the frame relay control unit 10.

When the frame relay control unit receives the instructions from the frame discrimination block 28, the frame control unit 10 causes the TTL decrement block 12 to carry out the TTL decrement calculation. Frame data is supplied from the frame forwarding block 11 to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

The frame transmitting unit 5 converts the frame format of the frame into a frame format suitable for the network and outputs the frame data to the network.

According to the example 8, it is determined whether the received frame is a frame, to be applied with the TTL decrement calculation, including a multicast address or a specific terminal address or whether the received frame is a frame belonging to a specific protocol. If the received frame is such a frame, the TTL decrement calculation is carried out and the received frame is relayed. As a result, the disadvantages caused by not carrying out the TTL decrement calculation in the



27

EP 0 886 404 A2

28

examples 1 through 6 can be eliminated.

#### (9) The Example 9

In this example, each entry of the routing table is provided with an area in which a decrement compulsion flag is written indicating the TTL decrement calculation should be compulsorily carried out. The decrement compulsion flag of an entry corresponds to a path to which a frame should be relayed after the TTL decrement is carried out. In the frame relay operation, if the decrement compulsion flag of an entry hit in retrieving of the routing table has been set, the TTL decrement calculation is carried out and the frame is relayed. Thus, it can be specified whether the TTL decrement calculation should be carried out for each destination. In this example, the frame relay system is formed as shown in Fig. 9.

In the example 9, the routing table 21A is formed as shown in Fig. 24. The routing table 21A has the destination address area 21a and the compulsion decrement flag area 21g.

#### (Forming of the Routing Table)

In a case where a frame should be relayed to a specific destination, an administrator can cause the system to compulsorily carry out the TTL decrement calculation. In this case, the decrement compulsion flag in the area 21g for an entry is set.

#### (Frame Relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the format of the received frame into a frame suitable for the system.

The destination address extracting unit 6 extracts a destination address from the received frame.

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port.

The output port determination block 29 checks whether the decrement compulsion flag of an entry hit in retrieving of the routing table 21A has been set.

If the compulsion decrement flag has been set, the output port determination block 29 supplies instruction for the TTL decrement calculation to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions from the output port determination block 29, the frame relay control unit 10 causes the TTL decrement block 12 to carry out the TTL decrement calculation. Frame data is supplied from the frame forwarding block 11 to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

The frame transmitting unit 5 converts the format of the frame into a format suitable for the network and out-

puts the frame to the network.

According to the example 9, when the decrement compulsion flag in the area 21g of the entry hit in retrieving of the routing table 21A has been set, the TTL decrement calculation is carried out and the frame is relayed. Thus, the disadvantages caused by not carrying out the TTL decrement calculation in the examples 1 through 6 can be eliminated.

#### (10) The Example 10

In this example, the system is provided with a table, separated from the routing table, indicating a relationship between output ports and decrement compulsion flags indicating whether the TTL decrement calculation is carried out. A decrement compulsion flag of an entry corresponding to an output port through which a frame should be relayed after the TTL decrement calculation is carried out. The table used in the example 10 is formed as shown in Fig. 25. This table is separated from the routing table 21A and has an area 21b for the output ports and an area 21h for the decrement compulsion flag. This table is referred to as a TTL decrement compulsion table.

When the decrement compulsion flag of the output port decided by retrieving of the routing table has been set in the frame relay operation, the TTL decrement calculation is carried out and the frame is relayed. According to this, it can be specified whether the TTL calculation should be carried out for each output port. The frame relay system according to this example is formed as shown in Fig. 9.

#### (Forming of the Routing Table)

In a case where a frame is relayed to a specific output port, an administrator of the frame relay system can cause the system to compulsorily carry out the TTL decrement calculation. In this case, the decrement compulsion flag in the area 21f of an entry corresponding to the output port is set at "1"

#### (Frame Relay Operation)

The frame receiving unit 4 receives a frame from the network and converts the format of the received frame into a frame suitable for the system.

The destination address extracting unit 6 extracts a destination address from the received frame.

The table retrieving block 22 retrieves the routing table 21A indicating the relationship between the destination addresses and the output ports using the destination address extracted from the received frame as a key and decides an output port.

The output port determination block 29 checks, with reference to the TTL decrement table, whether the decrement compulsion flag of the output port decided by the table retrieving block 22 has been set.

If the decrement compulsion flag has been set, instructions for the TTL decrement calculation are supplied to the frame relay control unit 10.

When the frame relay control unit 10 receives the instructions from the output port determination block 29, the frame relay control unit 10 causes the TTL decrement block 12 to carry out the TTL decrement calculation. Frame data is supplied from the frame forwarding block 11 to the frame transmitting unit 5 of the output port decided by the table retrieving block 22.

The frame transmitting unit 5 converts the format of the frame data from the frame relay control unit 10 into a format suitable for the network and outputs the frame data to the network.

According to the example 10, when the decrement compulsion flag for the output port decided by retrieving of the routing table has been set, the TTL decrement calculation is carried out and the frame is relayed. Thus, the disadvantages caused by not carrying out the TTL decrement calculation in the examples 1 through 6 can be eliminated.

As has been described above, according to the present invention, only when the routing table is formed or updated so that circulation of a frame through the network occurs, the TTL decrement calculation is carried out. Thus, a relayed frame can be prevented from being circulated through the network. In addition, the number of times the TTL decrement calculation that causes the delay of the frame relay operation to be carried out is minimized. Thus, the fast frame relay operation can be performed.

The present invention is not limited to the aforementioned embodiments, and other variations and modifications may be made without departing from the scope of the claimed invention.

## Claims

1. A frame relay system which relays a received frame having a destination address and a frame TTL indicating a term of life of the received frame, said system comprising:

a routing table having entries, each of the entries indicating a relationship between a destination address and a control information item; retrieving means for retrieving said routing table based on a destination address included in the received frame; and

frame control means for carrying out a decrement calculation of the frame TTL of the received frame when a period of time has elapsed from a time at which an entry hit in retrieving of said routing table by said retrieving means was formed or updated is less than a predetermined value and for not carrying out the decrement calculation of the frame TTL when the period of time period is equal or

greater than the predetermined value.

2. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has an area in which a time at which the entry is formed or updated should be written, and wherein said frame control means includes:

means for writing a forming/updating time at which an entry is formed or updated in said routing table in the area of the entry when the entry is formed or updated; and calculation means for, in a frame relay operation, calculating the period of time that has elapsed from a time at which an entry hit in retrieving of said routing table was formed or updated based on the forming/updating time of the entry, wherein said frame control means carries out the decrement calculation of the frame TTL when the calculated period of time is equal to or less than the predetermined value.

3. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has a first area in which a time at which the entry is formed or updated should be written and a second area in which a flag indicating that an updating process for the entry has been completed should be written, and wherein said frame control means includes:

means for writing a forming/updating time at which an entry is formed or updated in said routing table in the area of the entry when the entry is formed or updated and resetting the flag; and calculation means for, in a frame relay operation, calculating the period of time that has elapsed from a time at which an entry hit in retrieving of said routing table was formed or updated based on the forming/updating time of the entry if the flag of the entry has not yet been set, wherein said frame control means carries out the decrement calculation of the frame TTL when the calculated period of time is equal to or less than the predetermined value, and said frame control means does not carry out the decrement calculation of the frame TTL and sets the flag when the calculated period of time is equal to or greater than the predetermined value.

4. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has a first area in which a time at which the entry is formed or updated should be written and a second area in which a flag indicating an updating process for the entry has been completed should be written,

31

EP 0 886 404 A2

32

and wherein said frame control means includes:

means for writing a forming/updating time at which an entry is formed or updated in said routing table in the area of the entry when the entry is formed or updated and resetting the flag;

calculation means for monitoring flags for the respective entries in said routing table and calculating a period of time that has elapsed from a time at which an entry for which the flag has not yet been set was formed or updated; and means for setting the flag of an entry in which the calculated period of time is equal to or greater than a predetermined value, wherein said frame control means carries out the decrement calculation of the frame TTL when the flag of the entry hit in retrieving of said routing table has not yet been set.

5. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has an area in which a flag indicating that an updating process for the entry has been completed should be written, and wherein said frame relay control means includes:

means for resetting the flag of an entry when the entry is formed or updated; and means for setting flags for all the entries at predetermined intervals, wherein said frame relay means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of said routing table has not yet been set in a frame relay operation.

6. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has an area in which a flag indicating that an updating process for the entry has been completed should be written, and wherein said frame relay control means includes:

a timer;  
means for resetting the flag of an entry and starting said timer from zero when the entry is formed or updated; and  
means for setting the flags of all the entries in said routing table when a value of said timer reaches a predetermined value, wherein said frame relay control means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of said routing table has not yet been set in a frame relay operation.

7. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has

a first area in which a first flag indicating that a updating process for the entry has been completed should be written and a second area in which a second flag indicating that the entry is being updated, and wherein said frame relay control means includes:

means for resetting the first and second flags of an entry when the entry is formed or updated; means for monitoring said routing table; means for setting the second flag of an entry for which it is detected based on a monitoring result that neither the first flag nor the second flag has not yet been set; and means for setting the first flag of an entry for which it is detected based on the monitoring result that only the first flag has not yet been set, wherein said frame relay control means carries out the decrement calculation of the frame TTL when the first flag of an entry hit in retrieving of said routing table has not yet been set in a frame relay operation.

8. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has an area in which a flag indicating that the entry corresponds to a static path should be written, and wherein said frame relay control means includes:

means for setting the flag of an entry when an administrator of said system specifies the entry corresponding to the static path, wherein said frame relay control means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of said routing table has been set in a frame relay operation.

9. The frame relay system as claimed in claim 1, wherein said frame relay control means includes:

means for determining whether the received frame includes a multicast address or a specific terminal address which type of address indicates that the decrement calculation of the frame TTL should be carried out for the received frame or whether the received frame is a frame belonging to a specific protocol, wherein said frame relay control means carries out the decrement calculation of the frame TTL when said means determines that the received frame includes the multicast address or the specific terminal address or that the received frame is the frame belonging to the specific protocol.

10. The frame relay system as claimed in claim 1, wherein each of the entries in said routing table has an area in which a flag indicating that the decre-

33

EP 0 886 404 A2

34

ment calculation of the frame TTL should be compulsorily carried out, and wherein said frame control means includes:

means for setting the flag of an entry corresponding to a path to which a frame should be relayed after the decrement calculation of the frame TTL is carried out, wherein said frame relay control means carries out the decrement calculation of the frame TTL when the flag of an entry hit in retrieving of said routing table has been set in a frame relay operation.

11. The frame relay system as claimed in claim 10 further comprising:

a table separated from said routing table, said table indicating that each of the output ports is a port for which the decrement calculation of the frame TTL should be carried out; wherein said frame relay control means carries out the decrement calculation of the frame TTL when it is determined with reference to said table that an output port decided by retrieving of said routing table is the port for which the decrement calculation of the frame TTL should be carried out.

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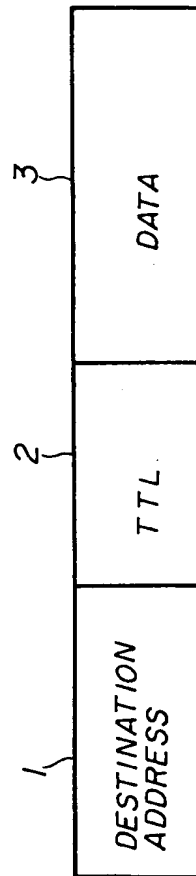
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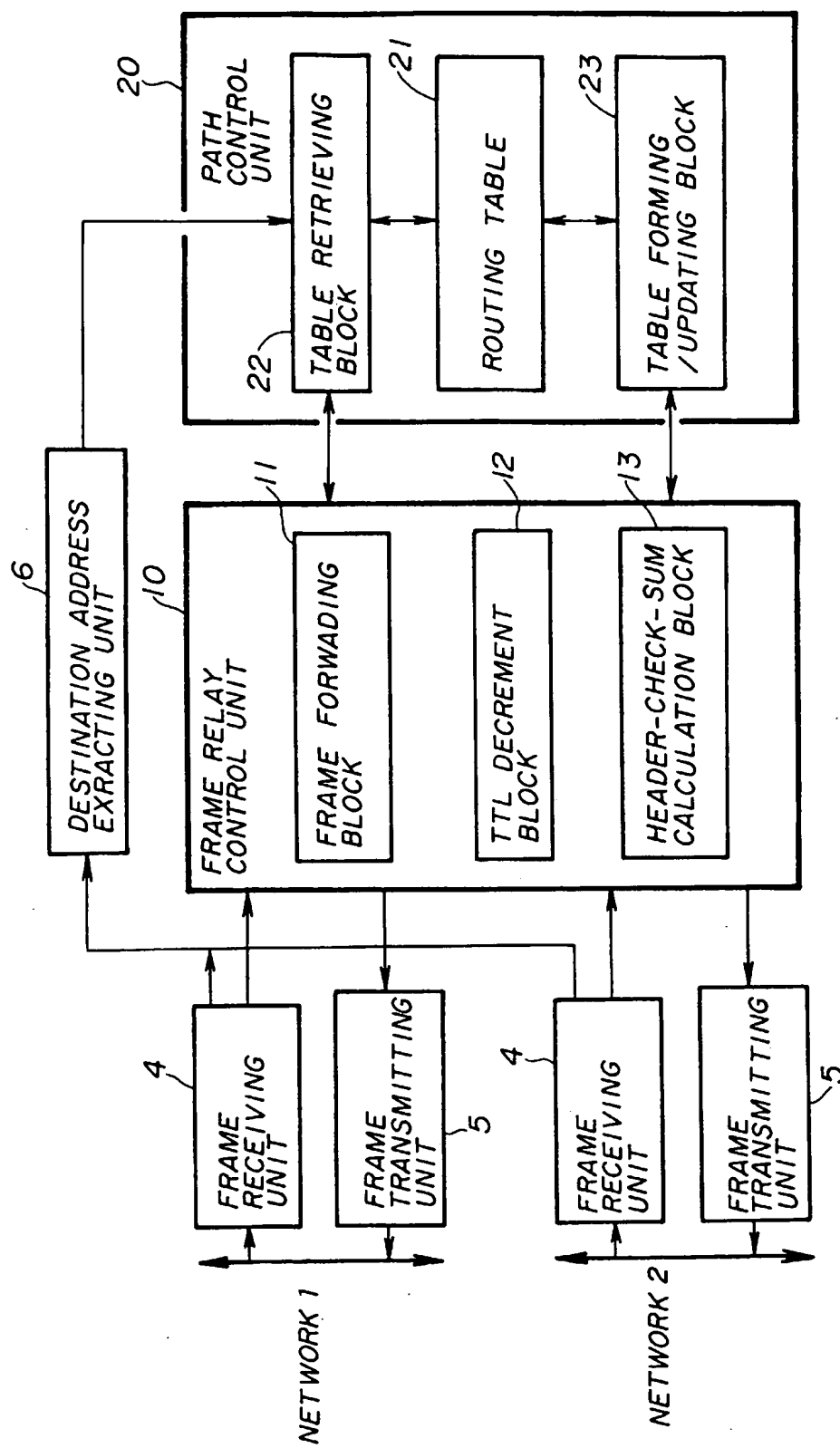
EP 0 886 404 A2

FIG. 1



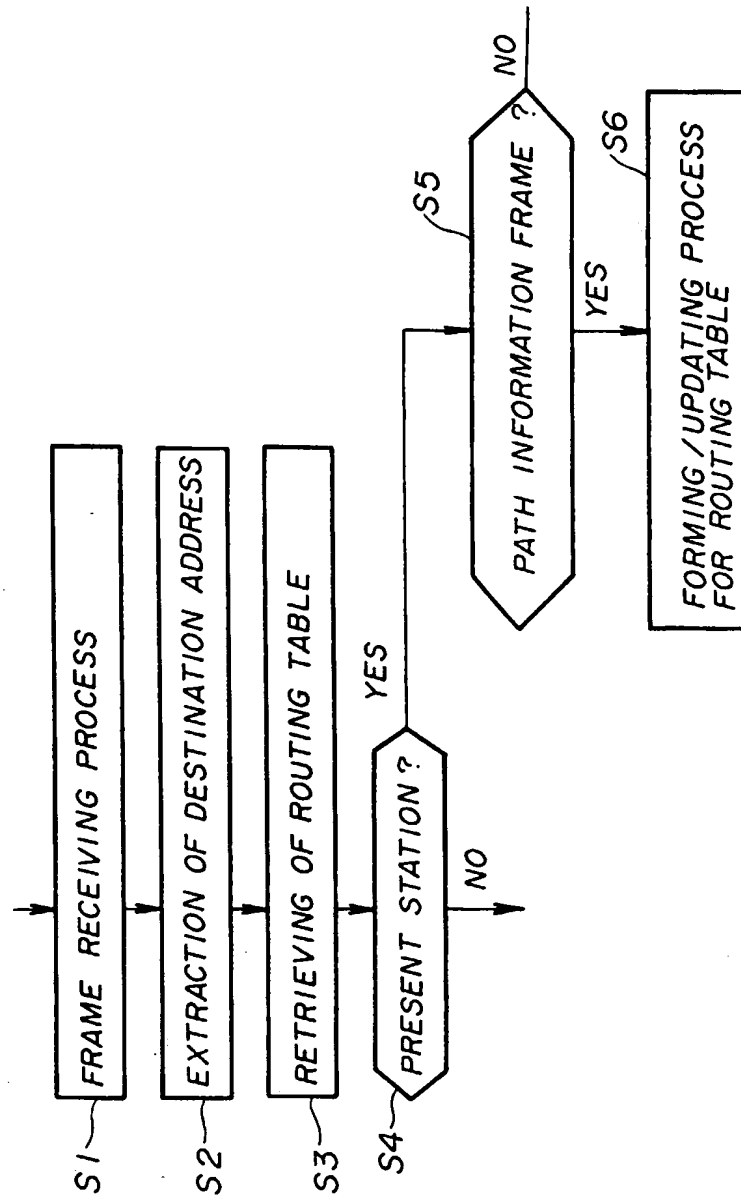
EP 0 886 404 A2

FIG. 2



EP 0 886 404 A2

FIG. 3

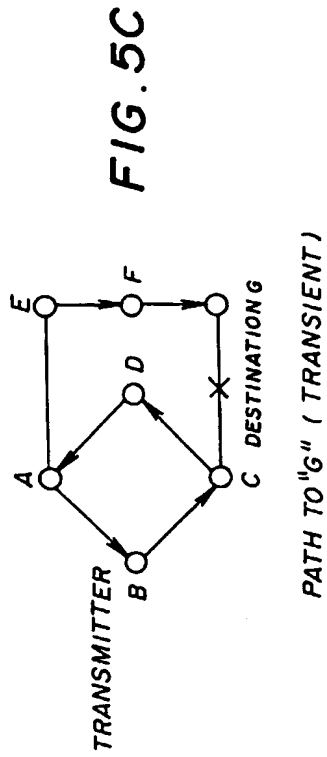
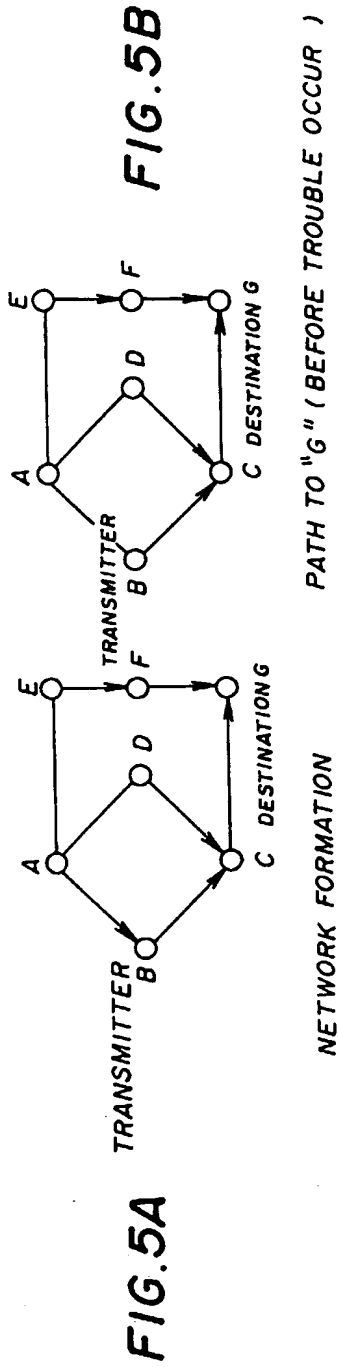


EP 0 886 404 A2

FIG. 4

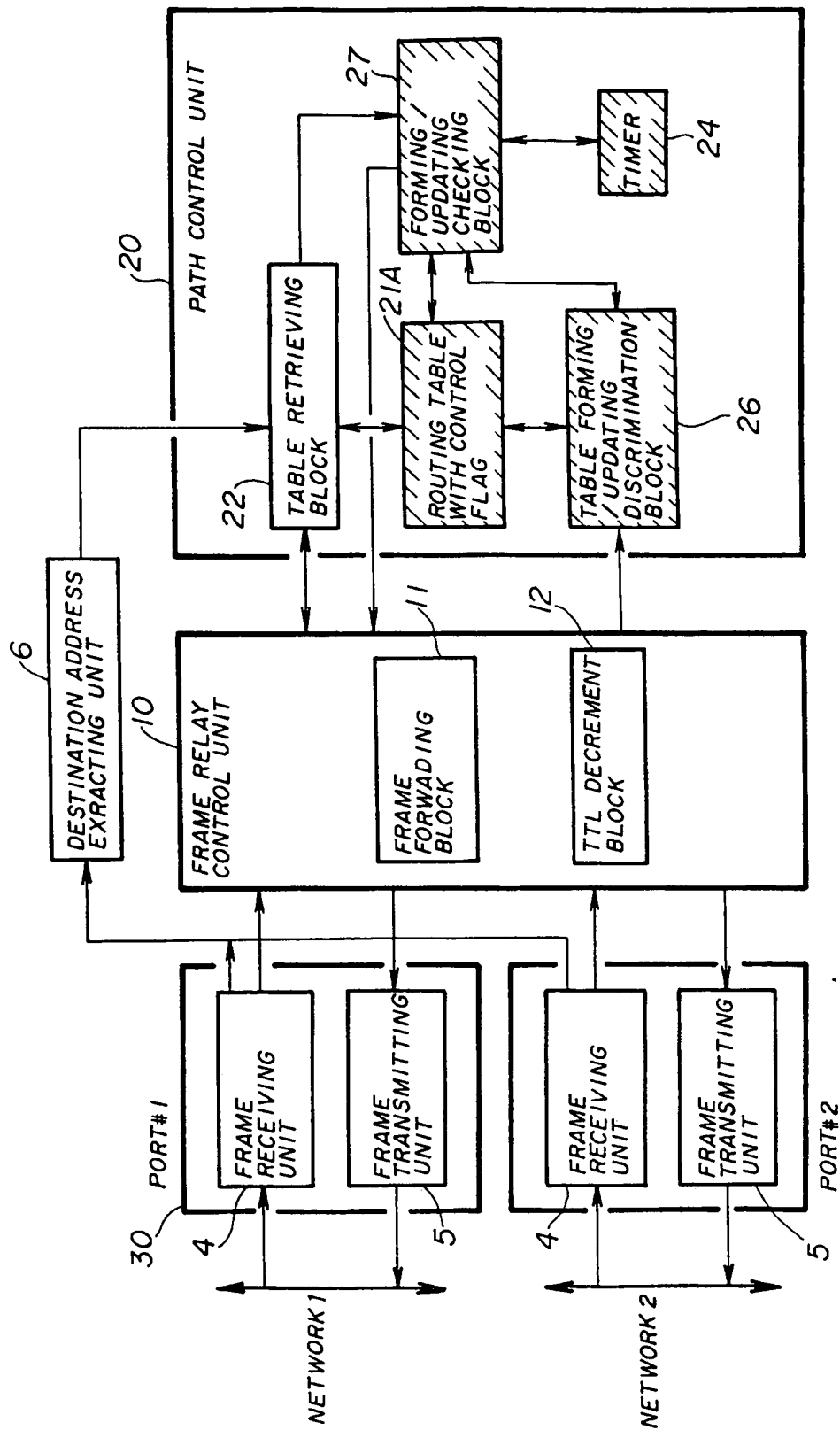
DESTINATION ADDRESS	OUTPUT PORT
AAAAAAA	#1
BBBBBBBB	#1
CCCCCCC	#2
DDDDDDDD	#3

EP 0 886 404 A2



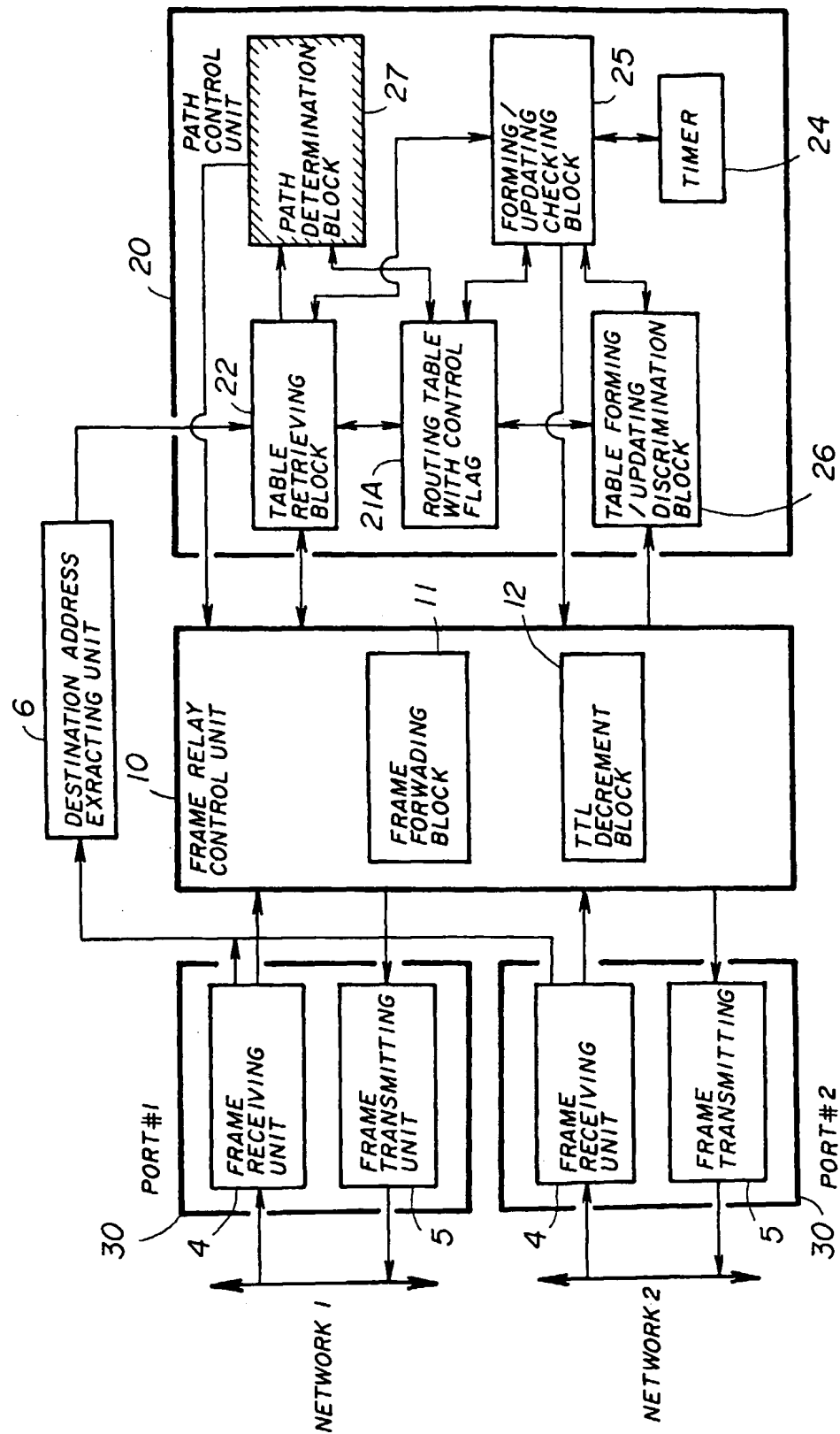
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FIG. 6



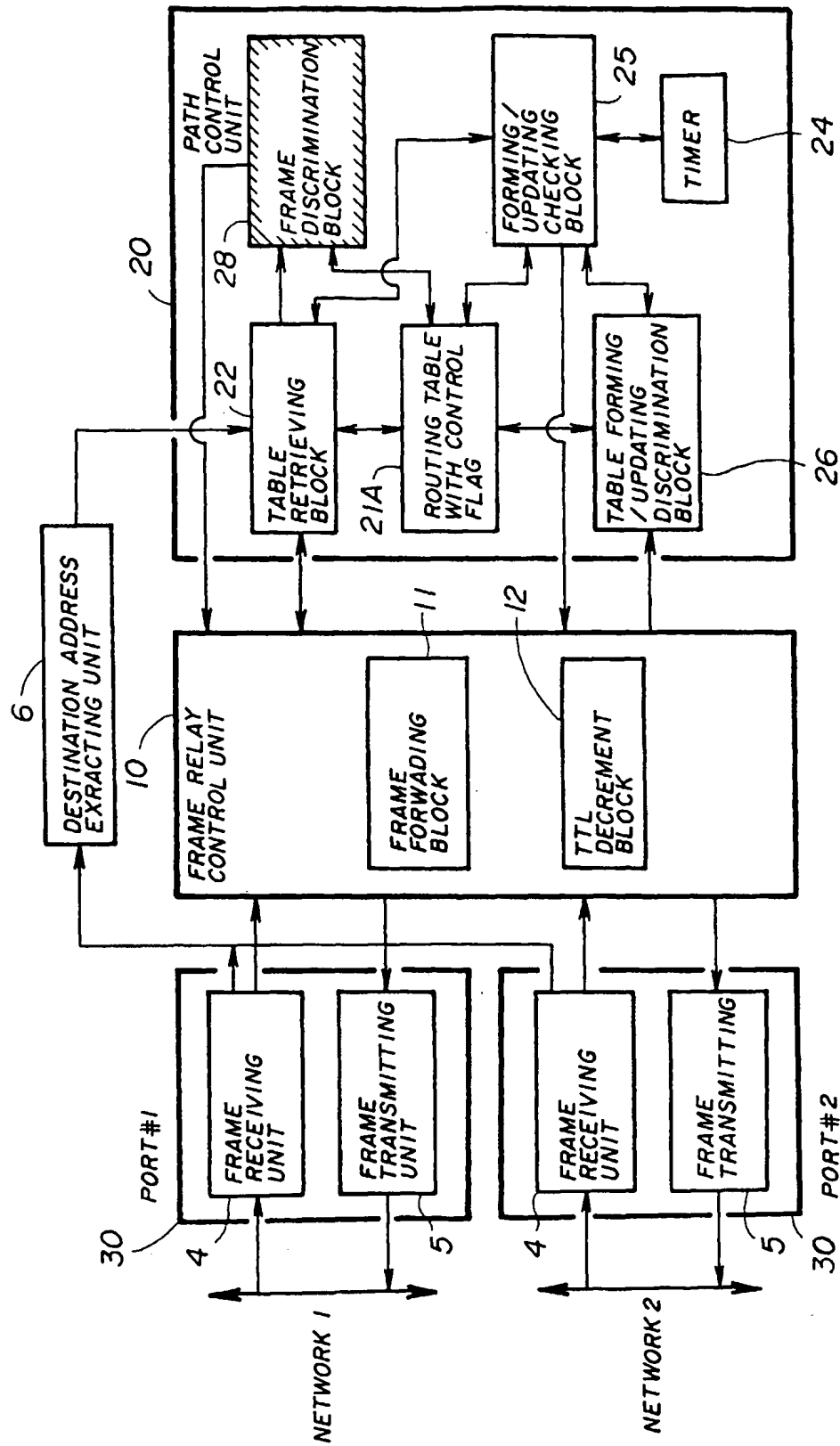
EP 0 886 404 A2

FIG. 7



EP 0 886 404 A2

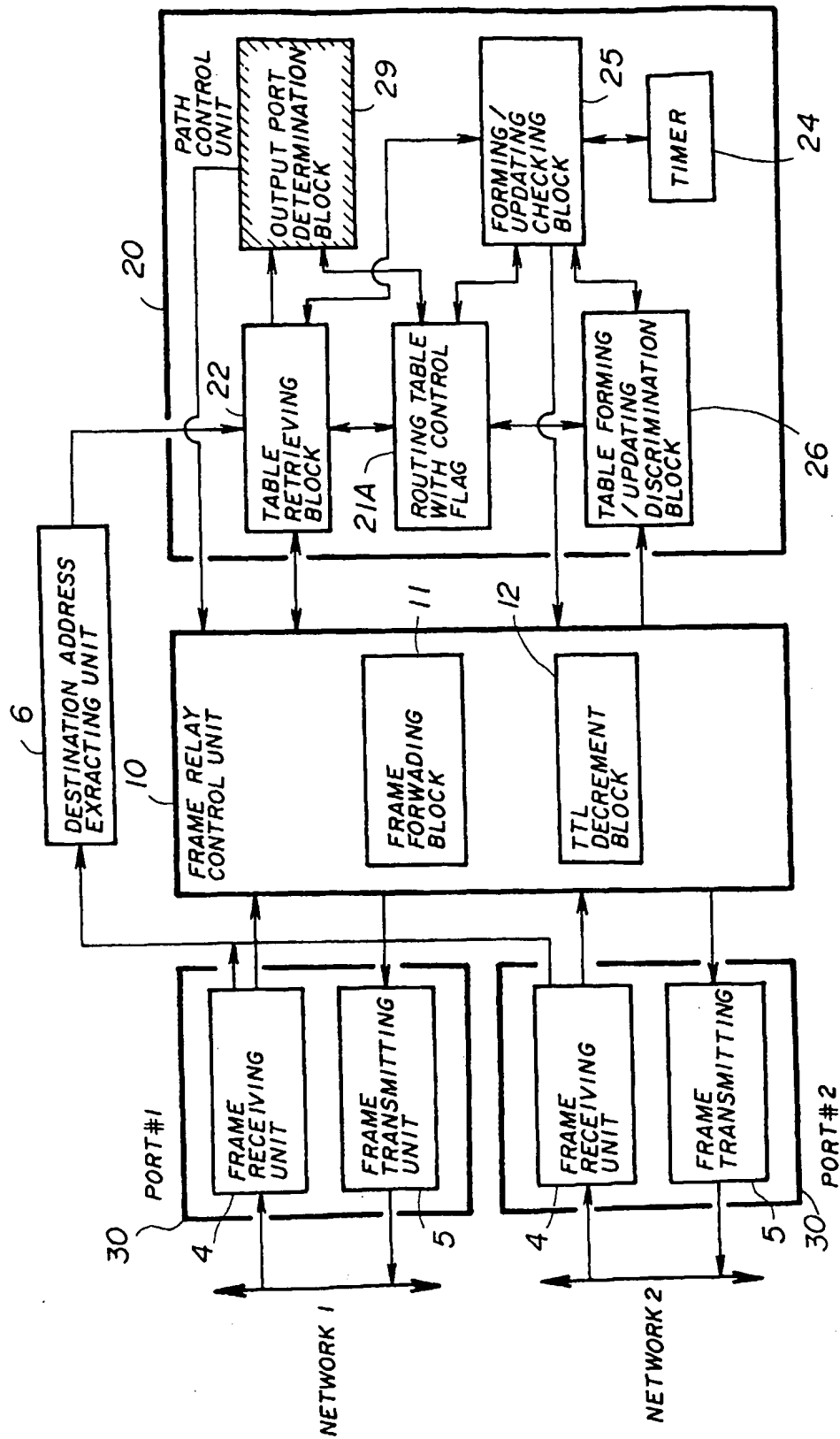
FIG. 8





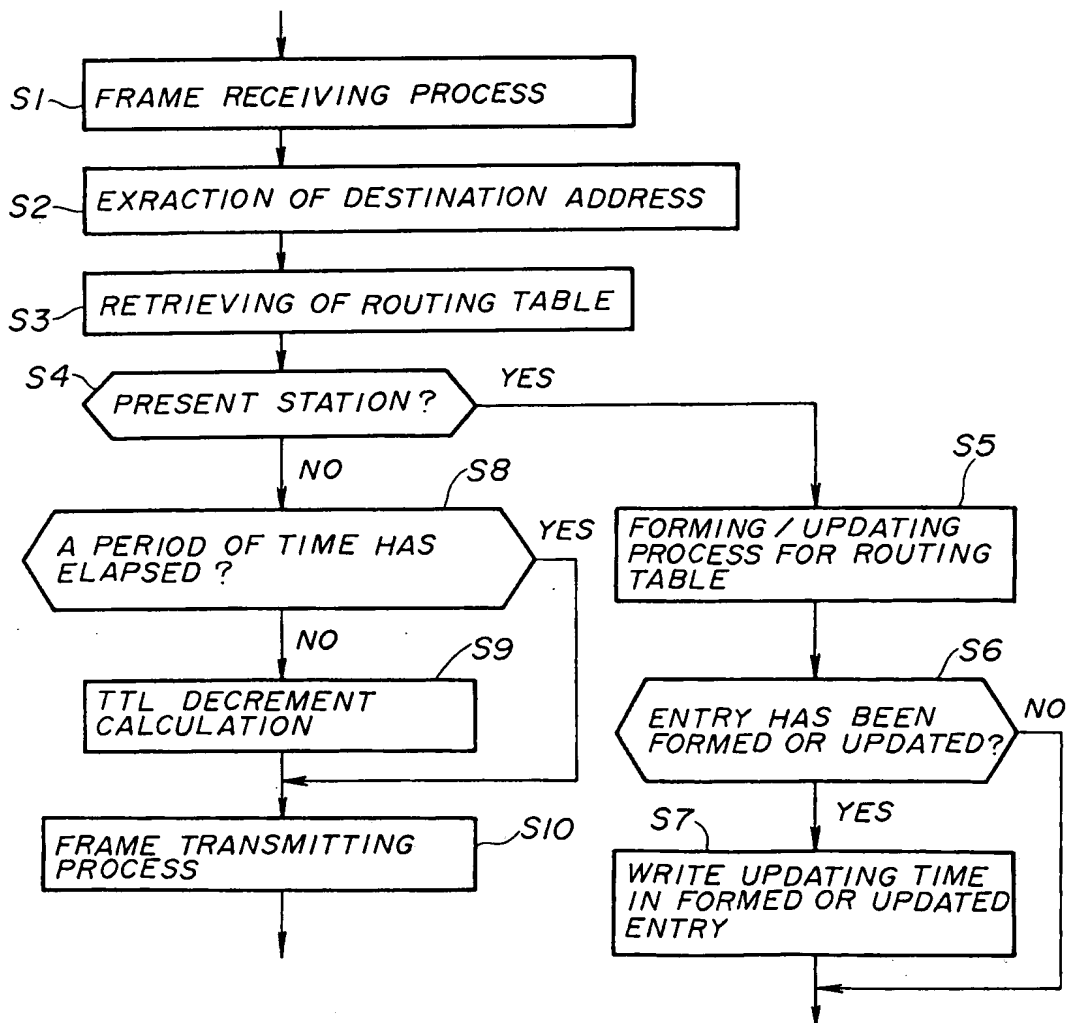
EP 0 886 404 A2

FIG. 9



EP 0 886 404 A2

FIG. 10



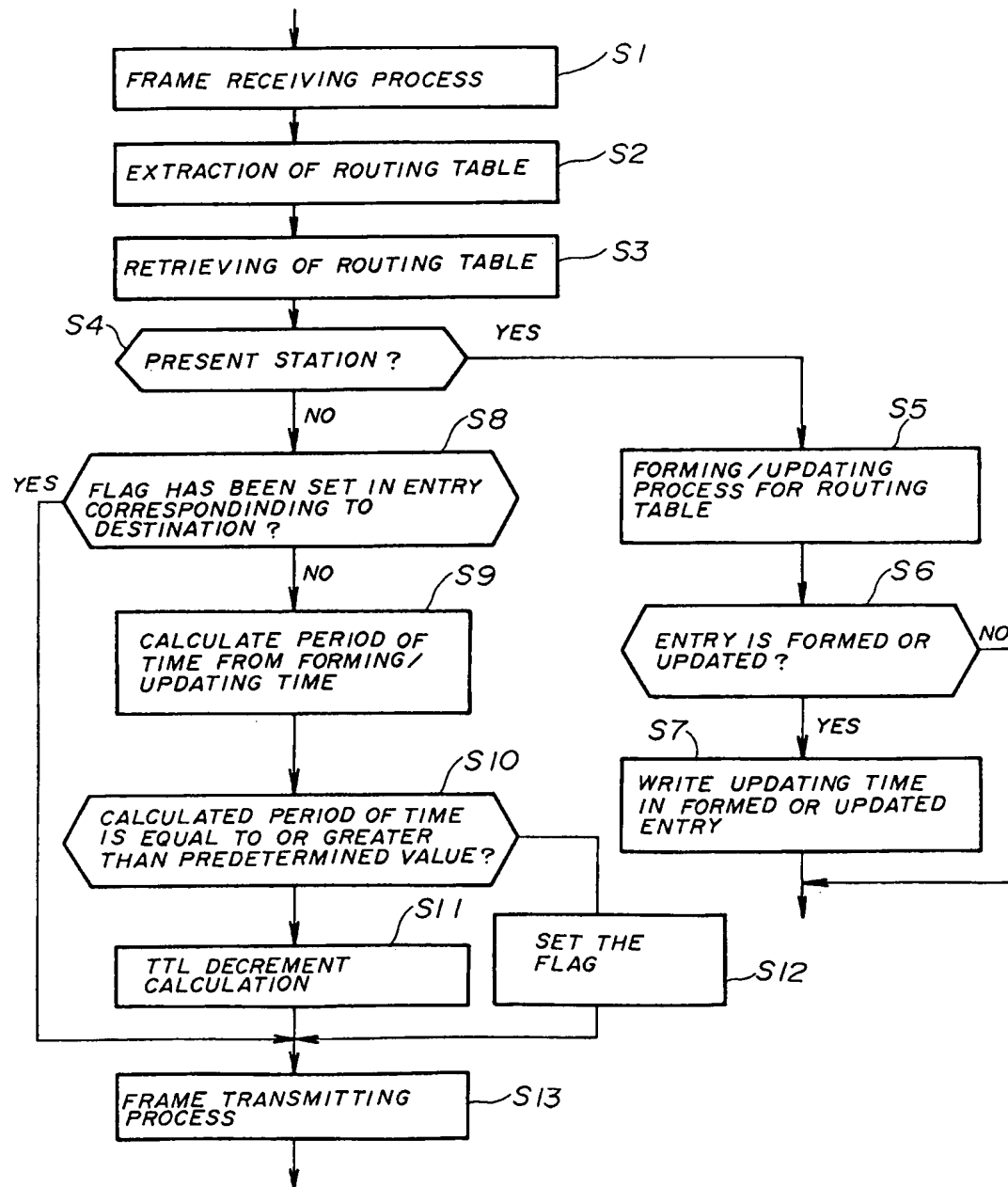
EP 0 886 404 A2

FIG. 11

21a DESTINATION ADDRESS	21b OUTPUT PORT	21c UPDATING TIME
AAAAAAA	#1	xx:xx:xx
BBBBBBBB	#1	yy:yy:yy
CCCCCCC	#2	zz:zz:zz
DDDDDDDD	#3	uu:uu:uu

EP 0 886 404 A2

FIG. 12



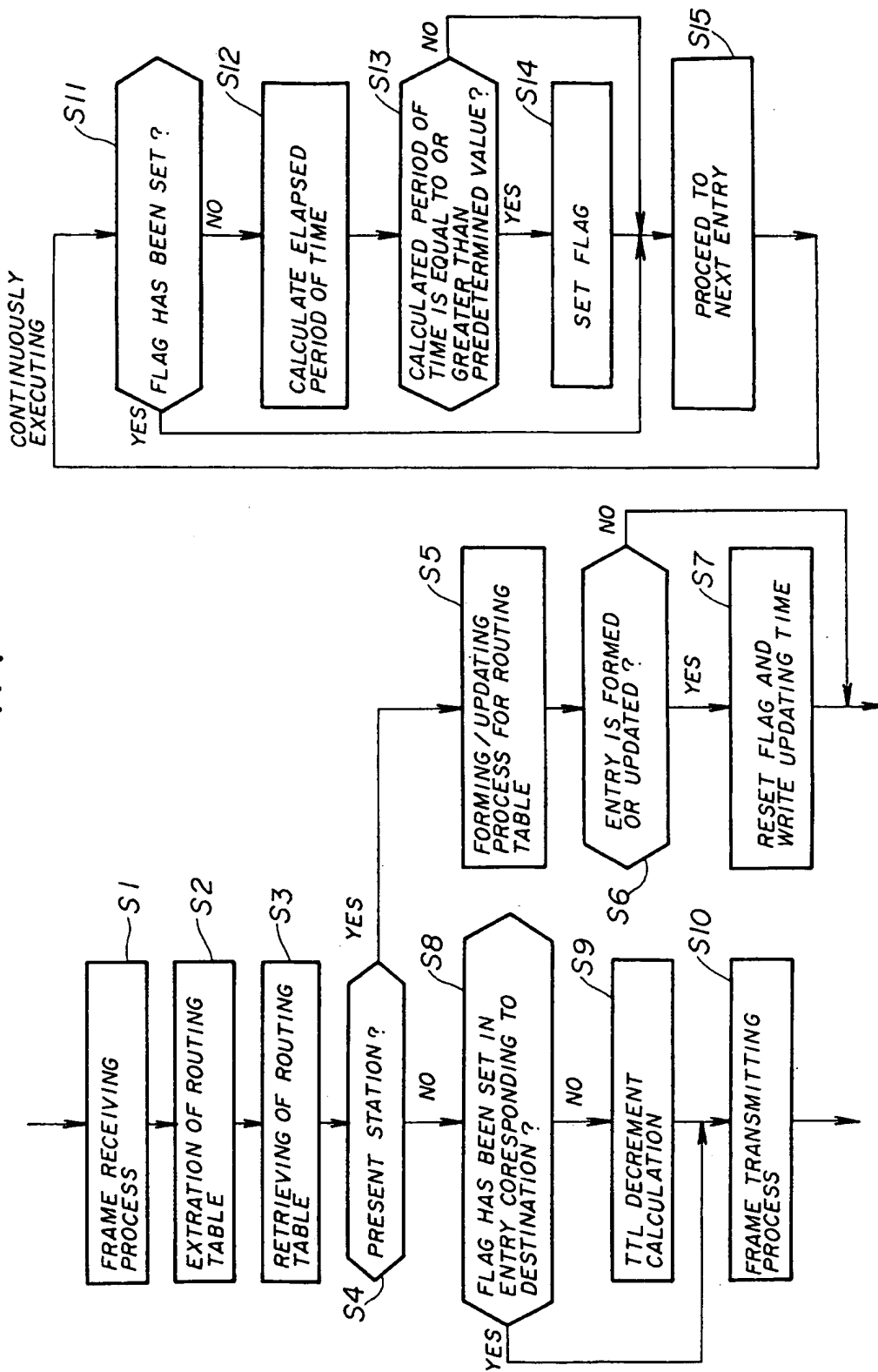
EP 0 886 404 A2

FIG. 13

21a	21b	21d	21c
DESTINATION ADDRESS	OUTPUT PORT	FLAG	UPDATING TIME
AAAAAAA	#1	1	xx:xx:xx
BBBBBBBB	#1	1	yy:yy:yy
CCCCCCCC	#2	0	zz:zz:zz
DDDDDDDD	#3	1	uu:uu:uu

EP 0 886 404 A2

FIG. 14



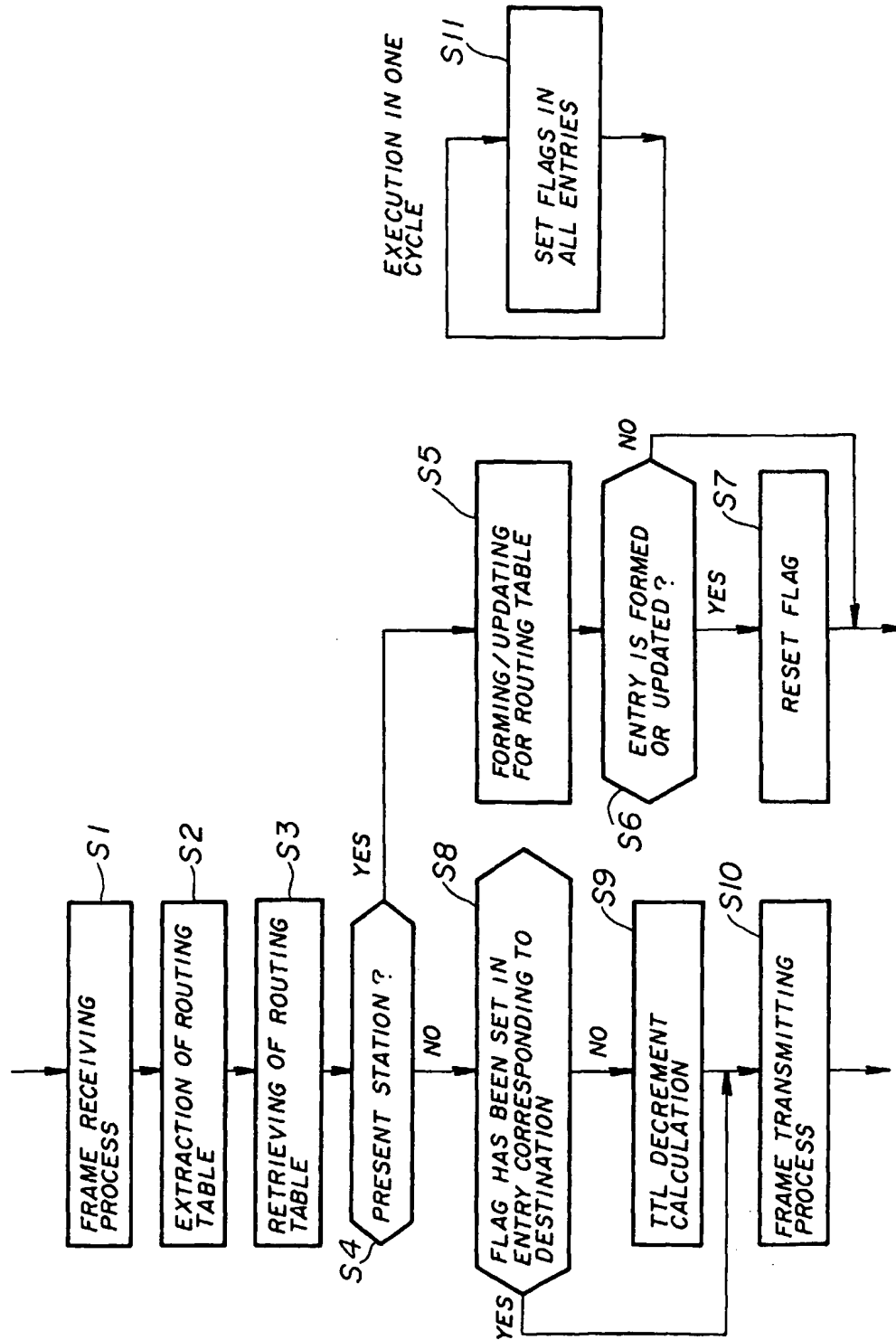
EP 0 886 404 A2

FIG. 15

21a DESTINATION ADDRESS	21b OUTPUT PORT	21d FLAG	21c UPDATING TIME
AAAAAAA	#1	1	xx:xx:xx
BBBBBBB	#1	1	yy:yy:yy
CCCCCCC	#2	0	zz:zz:zz
DDDDDDD	#3	1	uu:uu:uu

EP 0 886 404 A2

FIG. 16





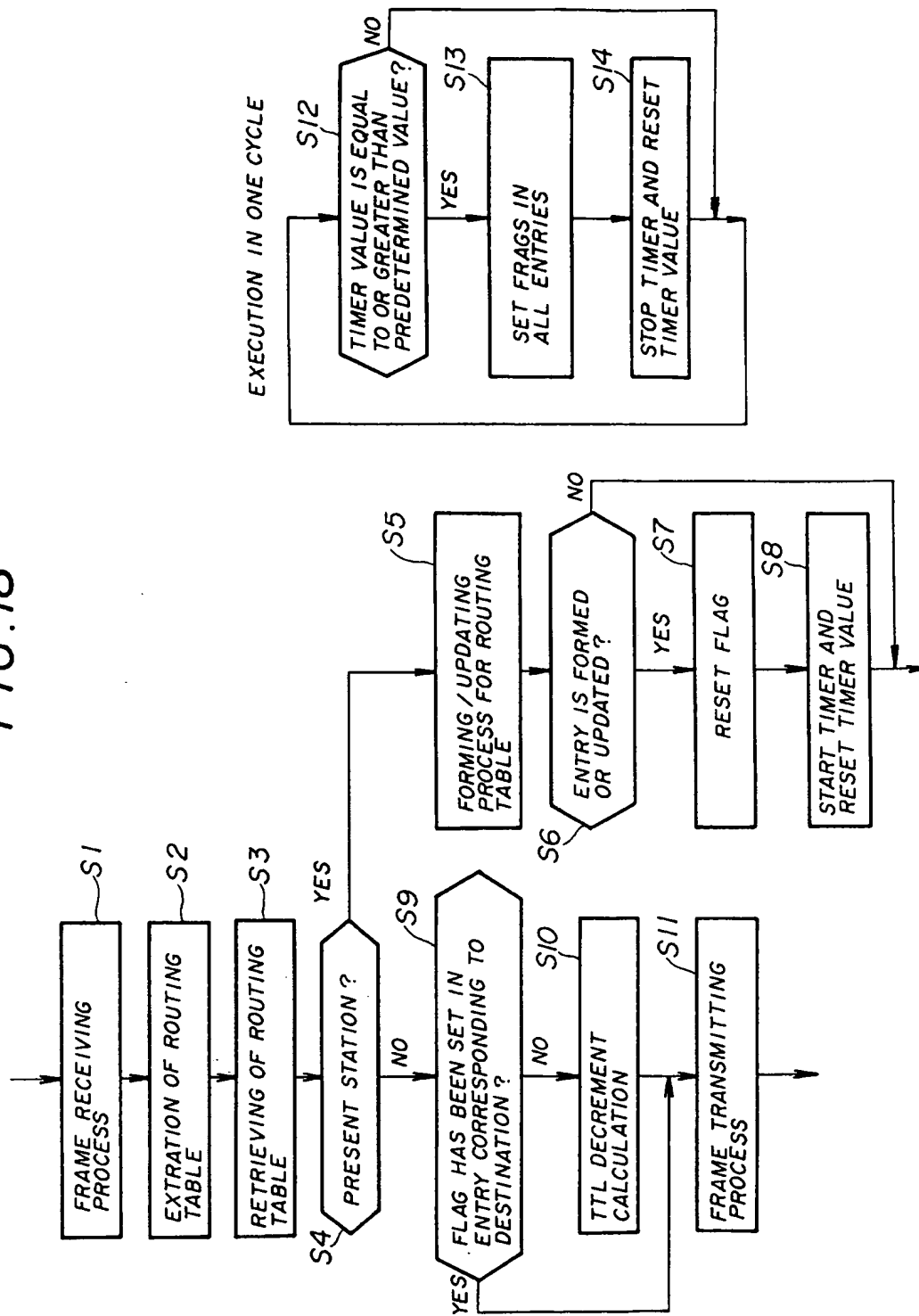
EP 0 886 404 A2

FIG. 17

21a DESTINATION ADDRESS	21b OUTPUT PORT	21d FLAG
AAAAAAA	#1	1
BBBBBBBB	#1	0
CCCCCCC	#2	0
DDDDDDD	#3	1

EP 0 886 404 A2

FIG. 18



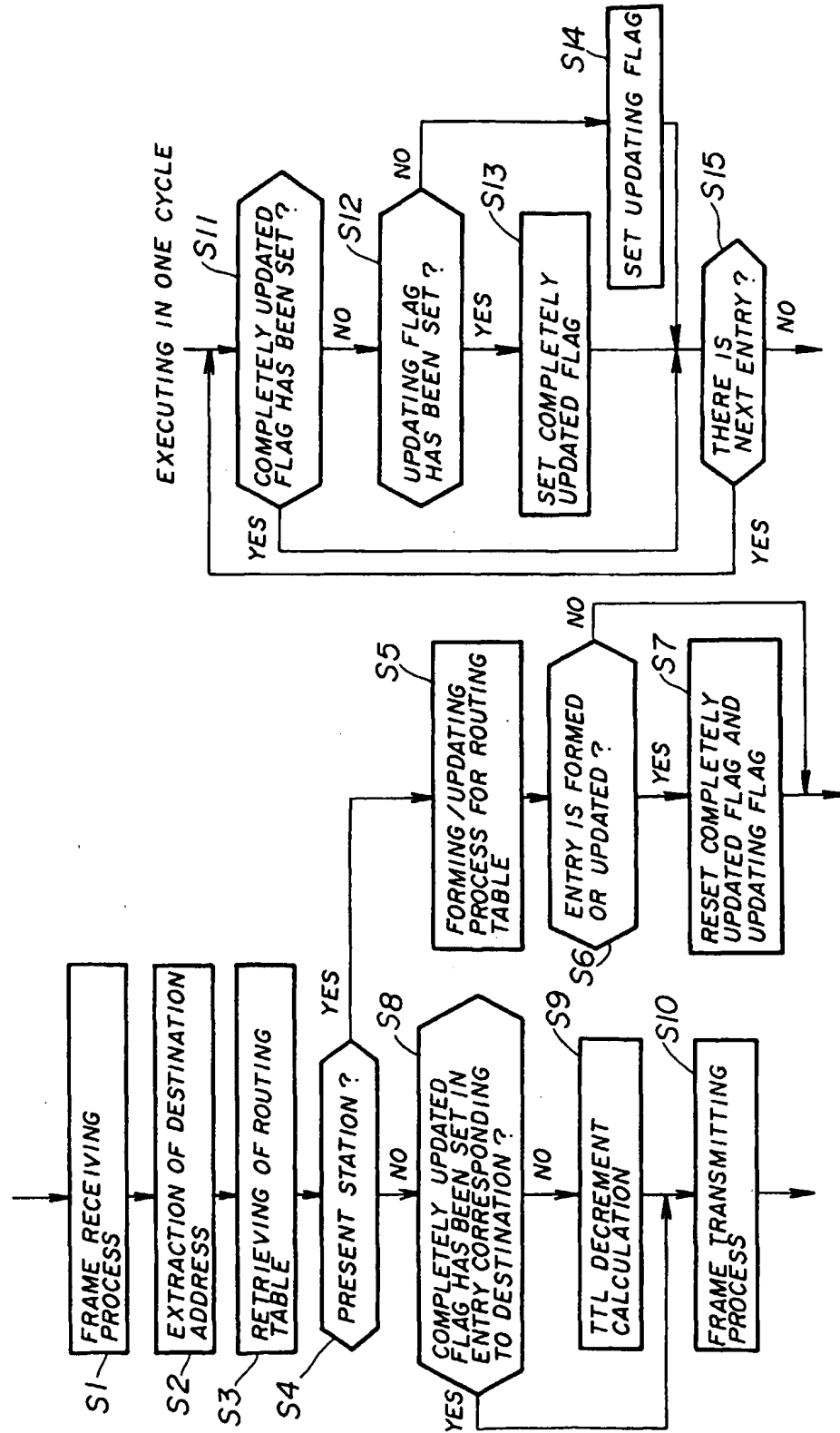
EP 0 886 404 A2

FIG. 19

21a DESTINATION ADDRESS	21b OUTPUT PORT	21d FLAG
AAAAAAA	#1	1
BBBBBBB	#1	0
CCCCCCC	#2	0
DDDDDDD	#3	1

EP 0 886 404 A2

FIG. 20



EP 0 886 404 A2

**FIG. 21**

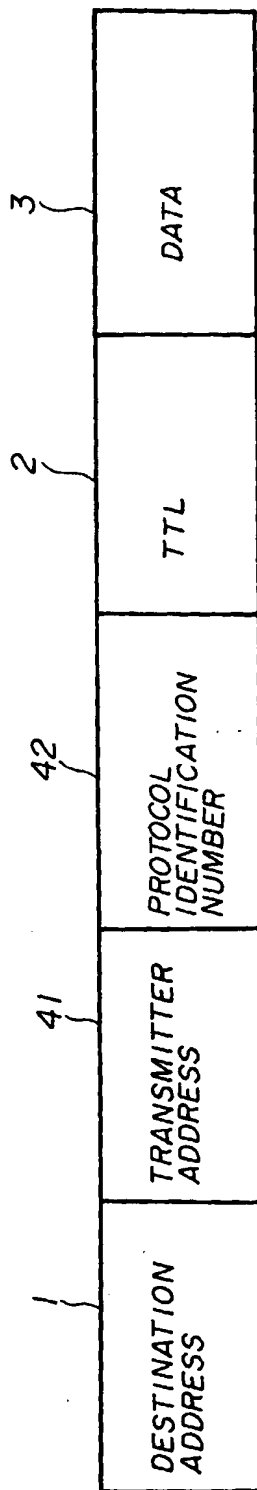
<i>21a</i> DESTINATION ADDRESS	<i>21b</i> OUTPUT PORT	<i>21d</i> COMPLETELY UPDATED FLAG	<i>21e</i> UPDATING FLAG
AAAAAAAAA	#1	1	—
BBBBBBBBB	#1	0	1
CCCCCCCCC	#2	0	0
DDDDDDDDD	#3	1	—

**FIG. 22**

<i>21a</i> DESTINATION ADDRESS	<i>21b</i> OUTPUT PORT	<i>21f</i> FLAG
AAAAAAAAA	#1	1
BBBBBBBBB	#1	1
CCCCCCCCC	#2	0
DDDDDDDDD	#3	0

EP 0 886 404 A2

FIG. 23



EP 0 886 404 A2

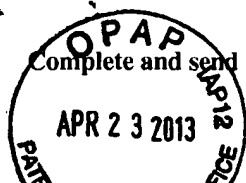
**FIG. 24**

DESTINATION ADDRESS	OUTPUT PORT	FLAG
AAAAAAA	#1	1
BBBBBBB	#1	1
CCCCCCC	#2	0
DDDDDDD	#3	0

**FIG. 25**

OUTPUT PORT	FLAG
#1	1
#2	1
#3	0
#4	0

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Patty Giebler (Depositor's name)  
Patty Giebler (Signature)  
4-18-13 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/29/2009	Qin Yin	29250H-000013/US	2600

TITLE OF INVENTION: METHOD AND APPARATUS FOR MANAGING ROUTE INFORMATION AND FORWARDING DATA IN ACCESS DEVICES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	<del>3770</del> \$1780	\$300	\$0	<del>3770</del> \$2080	04/22/2013
EXAMINER	ART UNIT	CLASS-SUBCLASS	04/25/2013 CNGUYEN3 00000004 122325 12310660			
DUONG, FRANK	2474	370-392000	01 FC:1501	1780.00 DA		
			02 FC:1504	300.00 DA		

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1. Harness, Dickey & Pierce, P.L.C.

2. \_\_\_\_\_

3. \_\_\_\_\_

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Authorized Signature

Patty Giebler

Patty Giebler

Date

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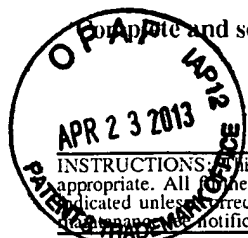
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30594 7590 01/22/2013  
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RESTON, VA 20195

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nonprovisional	NO	\$1470, \$1780	\$300	\$0	\$2070, \$2080	04/22/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
DUONG, FRANK	2474	370-392000

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1 Harnes, Dickey & Pierce, P.L.C.

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5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

Patty Giebler

Date

4-18-13

Typed or printed name

Patty Giebler

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/310,660	05/28/2013	8451839	29250H-000013/US	2600

30594 7590 05/08/2013  
 HARNESS, DICKEY & PIERCE, P.L.C.  
 P.O. BOX 8910  
 RESTON, VA 20195

**ISSUE NOTIFICATION**

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment is 322 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Qin Yin, Shanghai, CHINA;  
 Yingzhong Miu, Shanghai, CHINA;  
 Jianhua Zhu, Shanghai, CHINA;  
 Yifeng Yao, Shanghai, CHINA;

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AO 120 (Rev. 08/10)

<b>TO: Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been  
 filed in the U.S. District Court Western District of Texas on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 6:20-cv-487	DATE FILED 6/3/2020	U.S. DISTRICT COURT Western District of Texas
PLAINTIFF  WSOU INVESTMENTS, LLC d/b/a BRAZOS LICENSING AND DEVELOPMENT		DEFENDANT  ZTE CORPORATION, ZTE (USA) INC.; ZTE (TX), INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 U.S. 8,451,839	5/28/2013	WSOU Investments, LLC
2		
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
 Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy

AO 120 (Rev. 08/10)

<b>TO: Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been  
 filed in the U.S. District Court Western District of Texas on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 6:20-cv-211	DATE FILED 3/23/2020	U.S. DISTRICT COURT Western District of Texas
PLAINTIFF  WSOU INVESTMENTS, LLC d/b/a BRAZOS LICENSING AND DEVELOPMENT		DEFENDANT  ZTE CORPORATION, ZTE (USA) INC.; ZTE (TX), INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 U.S. 8,451,839	5/28/2013	WSOU Investments, LLC
2		
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5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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 Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy